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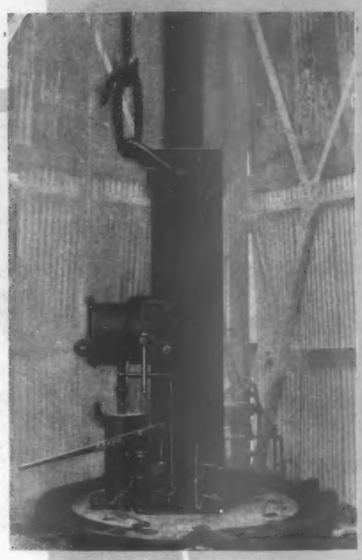
SAVE TIME, MONEY AND UNNECESSARY HANDLING

By Straightening Kellys and Drill Pipe The Modern Way



Baker Kelly Straightener in position on rotary table

WHILE THEY ARE SUSPENDED IN THE DERRICK

It's Easily and Economically Done with a BAKER PORTABLE HYDRAULIC KELLY AND PIPE STRAIGHTENER

This highly efficient and easily operated device utilizes the principle of the hydraulic ram, applying the force built up by a manually operated pump to the bend in the Kelly, Drill Collar, or Drill Pipe, as it hangs suspended in the derrick.

COMPLETELY PORTABLE

The entire unit is completely portable (weighing only 1200 pounds), and can easily be transported to the well on a small "pick-up" truck or trailer and set up on the rotary table by means of the catline.

ADVANTAGES OF STRAIGHTENING AT THE WELL

Even though shop facilities may be close at hand, there are a number of important advantages in straightening at the rig—advantages that result in substantial savings in time and money. Probably more Kellys are bent during transportation and in being laid down and picked up than from any other cause. Frequently a Kelly that has just been straightened will again be bent during the process of transporting it back to the well, rolling it off the truck and dragging it into the rig.

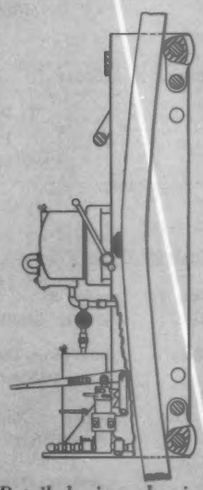
When the BAKER KELLY STRAIGHTENER is used, the job is done right on the rotary table with the Kelly hanging in its normal position. The hazards involved in transportation and handling are entirely eliminated as are also the cost of transporting the Kelly to and from the well, plus the time and expense entailed in removing and replacing it. In foreign or isolated fields, however, the Baker Kelly Straightener is considered indispensable as the cost and loss of time involved in transporting a bent Kelly or drill pipe to and from a distant shop makes it a serious matter.

CAN BE ADAPTED FOR HORIZONTAL PIPE STRAIGHTENING OPERATIONS

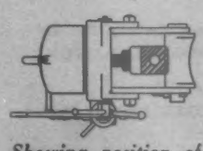
By the attachment of a simple, easily installed device the Baker Kelly Straightener can also be adapted for efficient, horizontal pipe straightening work. The same high efficiency and portability is maintained, plus the advantage of being able to utilize the Straightener for a wide variety of pipe straightening operations around the field and in the shop.

Send today for Complete Details and Prices

See Pages 270-272 of the 1940 Composite Catalog



Detailed view showing how ram contacts bend in Kelly or Drill Pipe



Showing position of Kelly in Straightener during operation

Showing position of Drill Pipe in Straightener during operation

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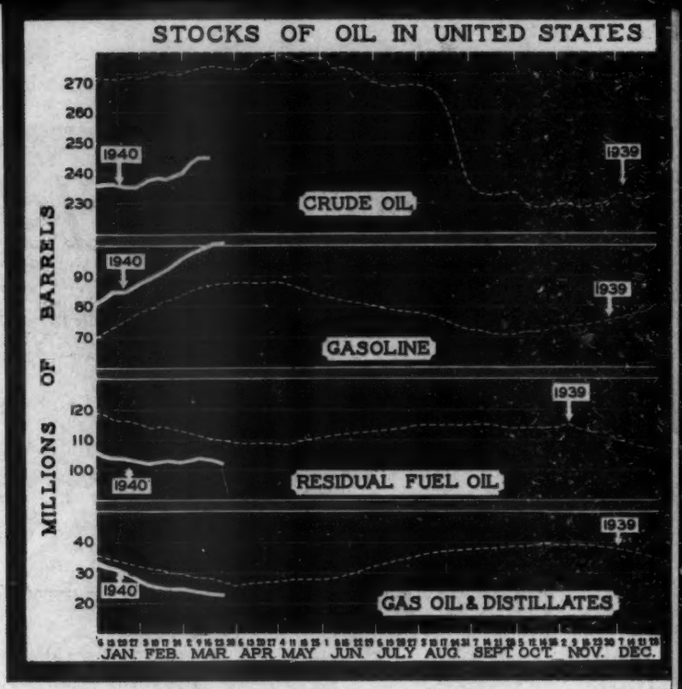
BAKER PORTABLE KELLY AND PIPE STRAIGHTNER

Trends

April Output Will Be Brought Nearer B. of M.'s Recommendation



INDICATIONS that the crude production of some of the larger oil states will be brought into closer balance with the Bureau of Mines recommendations during April than has been the case this month, were an encouraging development of the past week. Following a hearing last week, at which strong support developed among operators to keep the state's production in line with the B. of M.'s recommendation, the Texas Railroad Commission on Monday announced an allowable which, if enforced, will mean that the state's April output will be approximately 100,000 bbl. daily under the actual March output.

The government bureau in its April recommendations continued in its position that recent production and refinery operations have been far in excess of requirements, and it added only 50,000 bbl. daily to the estimated needs for next month. In effect, all of this increase for April goes to Illinois, the state being given an estimated demand of 380,000 bbl. daily for the 30 days which start next Monday. The report also points out that this expanding market for Illinois crude curtails markets for the Mid-Continent and the Gulf Coast. In line with this development the April recommendations for Oklahoma, Kansas, Arkansas and New Mexico are less than in March, with only small increases in Texas, Louisiana and California.

CRUDE PRODUCTION *3,885,061 bbl. daily average — down 4,903 bbl. One year ago 3,384,049 bbl.*

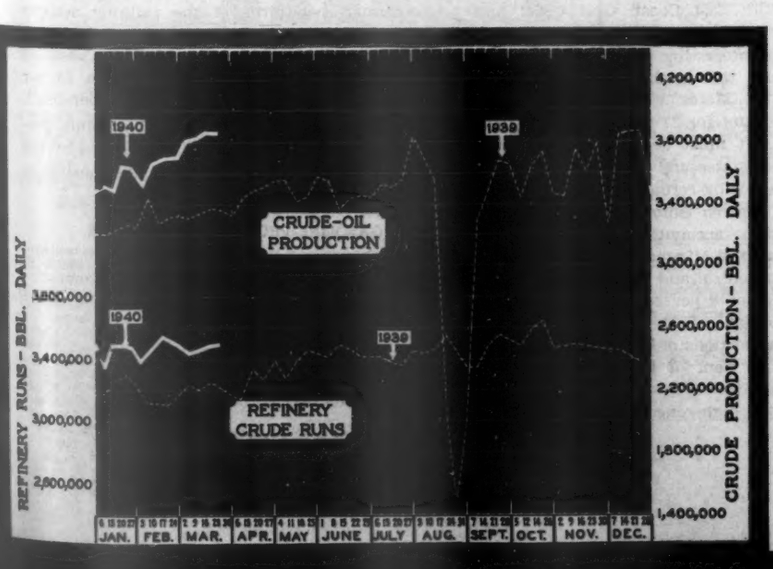
CRUDE STOCKS *246,762,000 bbl. as of March 16—up 1,000,000 bbl. One year ago 273,345,000 bbl.*

GASOLINE STOCKS *101,298,000 bbl. as of March 23 — up 682,000 bbl. One year ago 86,648,000 bbl.*

RESIDUAL FUEL-OIL STOCKS *102,798,000 bbl. as of March 23—down 760,000. One year ago 109,993,000 bbl.*

GAS OIL AND DISTILLATES *23,275,000 bbl. as of March 23—down 800,000. One year ago 26,720,000 bbl.*

REFINERY RUNS *3,560,000 bbl. daily week ended March 23 — up 60,000 bbl. One year ago 3,225,000 bbl.*



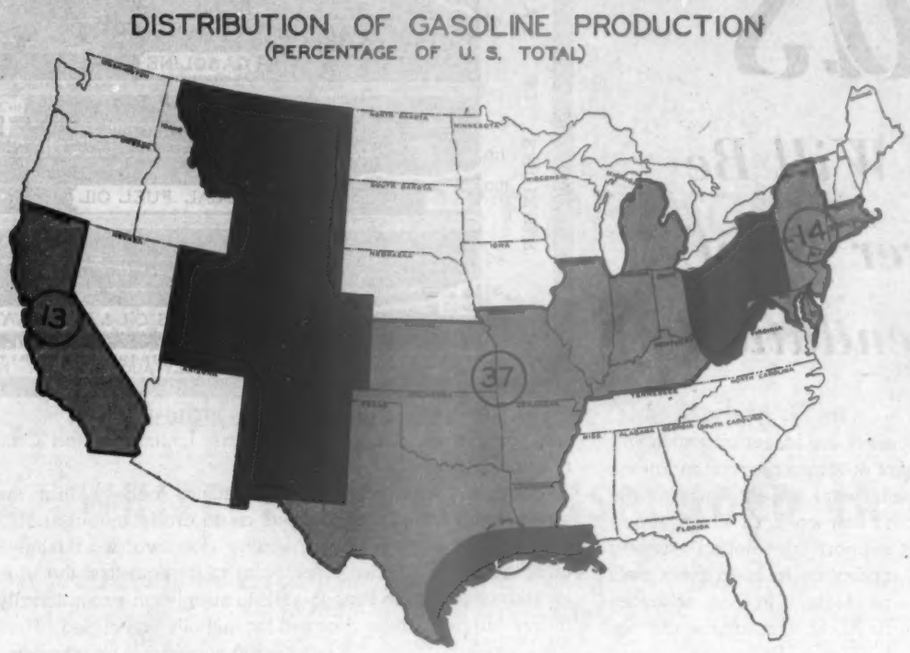
DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 23, 1940	Bur. Mines Mar. est. of demand	Mar. state allowables	Mar. 16, 1940
Oklahoma City	103,150	.....	.....	93,950
Seminole field	39,975	.....	.....	40,150
Remainder of state	281,750	.....	.....	282,275
Total Oklahoma	424,875	420,300	420,300	416,375
East Texas	397,000	.....	.....	397,000
West Texas	273,949	.....	.....	269,261
North Central Texas	136,854	.....	.....	141,683
Texas Panhandle	82,589	.....	.....	80,290
East Central Texas	89,846	.....	.....	89,346
Gulf Coast Texas	402,210	.....	.....	398,311
Southwest Texas	114,890	.....	.....	113,541
Total Texas	1,497,338	1,330,600	1,535,600	1,489,432
North Louisiana	68,420	.....	.....	67,605
Gulf Coast Louisiana	210,348	.....	.....	212,350
Total Louisiana	278,768	253,200	277,412	279,955
California	603,250	587,100	592,000	622,500
Kansas	180,150	153,900	170,000	176,750
Arkansas	69,245	65,500	70,000	69,750
Mississippi	8,015	1,300	.....	8,800
Eastern fields	109,150	111,700	.....	106,200
Illinois	446,521	329,700	.....	455,755
Michigan	63,859	64,800	.....	64,667
New Mexico	114,760	103,200	114,000	113,820
Rocky Mountain area	89,130	79,300	.....	85,960
Total United States	3,885,061	3,500,600	.....	3,889,364

Most observers within the industry believe that the government's recommendations as to crude output should be followed, with a corresponding downward adjustment in refinery operations. They point to the fact that the urge for maximum crude runs to stills to supply an exceptionally heavy fall and winter demand for fuel oils has ended. They also agree that gasoline production should not be increased until the seasonal expansion in demand has passed current output and there have been large withdrawals in stocks, which appear headed for a record-breaking level of 105,000,000 bbl.

The recent increases in crude-oil stocks are also offered in support of the contention that April operations should be curtailed. It is estimated that the high operating levels in Texas will mean that approximately 4,000,000 bbl. of crude oil will be added to storage this month. This has resulted in supplies being more freely offered at several points in the state, although there is no tendency to give concessions under posted prices. The Gulf Coast market continues to be dominated by a slow export and coastwise demand. There have been indications that the Allies will be willing to increase their purchases as soon as a sufficient number of tankers are assured. It is said that convoy shipments have been speeded up in recent weeks.

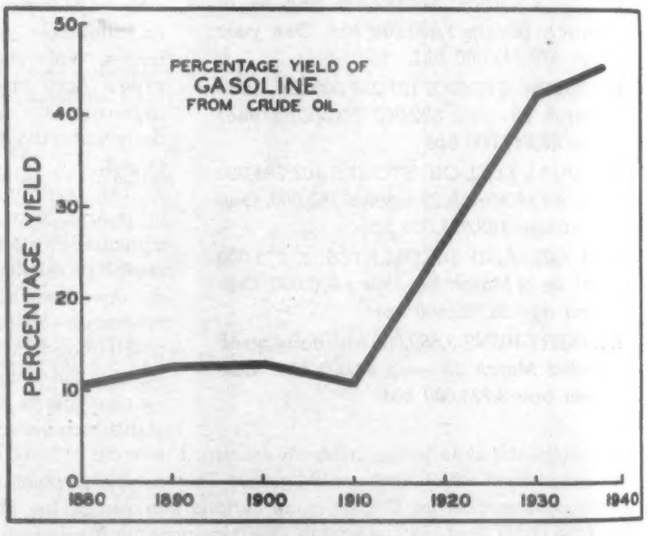
Two-Thirds World's Refining In North



Oil refineries in the U. S. are operating in three-fourths of the states to produce two billion dollars worth of products annually. Utilizing crude oil and natural gas as raw materials, these plants produce not only motor fuels, burning oils and lubricants but the bases for certain plastics, anaesthetics, naphthenic soaps, explosives, synthetic rubber and many types of industrial solvents.

By W. T. ZIEGENHAIN

Above: Numbers inside each circle indicate percentage of total United States gasoline production made by refineries in that area. Grouping of refineries based primarily on common or dependent source of crude oil in each area



Right: Until 1910 all gasoline was made by simple distillation of the crude. Thereafter thermal cracking was applied at a rapid rate. Reaching a near-saturation in 1930, the increased gasoline yields since then has been due largely to improvements in the thermal process, to polymerisation, catalytic cracking, alkylation and lower losses

THE 453 refineries operating in the United States account for 59 per cent of the total refining capacity of the world. The nearest rival is Soviet Russia, but the combined capacities of its plants is only one-seventh that of the United States.

Fortifying the important position held by the industry in the United States is the capacity of the very large plants in the West Indies. These are at a relatively short distance from the southern tip of Florida and these alone account for 8 per cent of the world's refining capacity. To this may be added the refining capacity of Canada, Mexico and Cuba to bring the total for the North American Continent to 71 per cent. Thus, within this one area more than two-thirds of the world's total refining capacity is accounted for.

Such a concentration of petroleum refining can be readily justified by reason of the availability of large supplies of crude oil, an abundance of technically trained men, a wide variety of equipment and supplies and a most favorable market outlet for the finished products.

The oil-producing fields of Texas, California, Oklahoma, Louisiana, Illinois and 15 other states supply 97 per cent of the crude oil processed by refineries in the United States. In 1939 the actual quantity refined was 1,237,840,000 bbl. This quantity was refined by the 453 refineries scattered throughout 34 states.

The map of the United States which appears on this page shows the major refining divisions of the country with plants grouped to reflect a common source of crude. The gasoline production of each division was calculated and on this basis the relative importance of each area is shown. The figure in each area reflects the percentage of gasoline that area supplies as a portion of the total of the United States. On this basis a refining area which practices a high degree of cracking is able to report a large gasoline production and vice versa.

Generally speaking, this method penalizes the Mid-Continent, California and western Pennsylvania refining areas and trends to emphasize the importance of the East Coast, Gulf Coast and Chicago areas.

However, it is interesting to note that despite the penalty which this method places upon the Mid-Continent, the states which make up the central group account for 37 per cent of the total gasoline output. It must be conceded that the area covers many states and of this total, 18 per cent is accounted for by refineries in Indiana, Illinois, Michigan, western Ohio and Kentucky and only 11 per cent is accounted for by plants in Oklahoma, Kansas and Missouri. Arkansas, North Louisiana, North Central and West Texas account for the remainder or 8 per cent.

Second in importance is the Gulf Coast area in which the coastal portions of Texas and Louisiana account for 29 per cent of the total. The area included in this division is comparatively small and emphasizes the high concentration of refining here.

Thus, in the Central and Gulf Coast areas is concentrated two-thirds of the refining activity of the country. The other one-third is accounted for by California (13 per cent), East Coast (14 per cent), the Pennsylvania Grade area (4 per cent) and the Rocky Mountain states (3 per cent).

Making the same comparison of gasoline production but using the divisions as reported by the Bureau of Mines, the following relationship is presented:

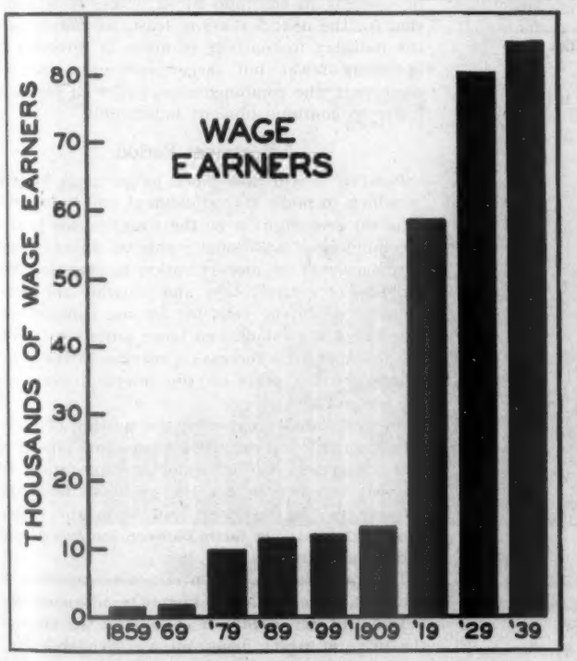
GASOLINE PRODUCTION BY AREAS

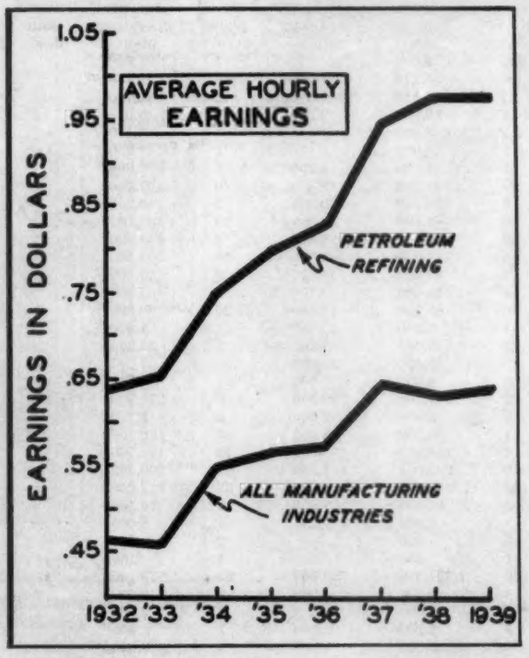
District—	Percentage of total U. S. output
East Coast	14
Appalachian	4
Indiana, Illinois, etc.	18
Oklahoma, Kansas, Missouri	11
Texas inland	5
Texas Gulf	26
Louisiana Gulf	3
Arkansas and Louisiana inland	3
Rocky Mountain	3
California	13
Total United States	100

Centers America

Analyzing further the relative importance of refining on the basis of gasoline production, it is interesting to note the higher yields of gasoline made by refiners in one district compared with another. For example, refiners in the California area recover but 34.4 per cent gasoline from each barrel of crude processed while refiners in the Indiana-Illinois area recover 53.1 per cent. Obviously, the difference is due to the relatively good demand for residual fuels in the California area and the absence of the pressing need to crack or reform large quantities of distillates there. The latter is not so necessary because California crudes produce motor fuels which have a naturally high-octane value.

Right: Refiners in the United States have trebled gasoline production within the past 15 years. The broad white line clearly shows the trend. A break in the steep climb came during worst part of depression





Extreme left: Close to 90,000 wage earners are employed in oil refining and there are about 15,000 salaried office employes making a total of more than 100,000 people employed exclusive of refinery executive personnel. The large increase in the number of employes shown in 1919 when compared with 1909 is due to the general application of cracking during the 10 years which intervened

Left: Refinery wage-earners receive the highest rates of pay among all manufacturing industry employes. A general advance in hourly rates since 1932 is shown for all manufacturing industries but the advance here has been slower and of lesser amount than in refining.

The relationship among all refining areas with respect to gasoline yields from crude is shown in the following table:

PERCENTAGE YIELD OF GASOLINE FROM CRUDE OIL RUN BY REFINERS IN THE UNITED STATES

District—	Gasoline yield (percentage)
East Coast	39.4
Appalachian	48.3
Indiana-Illinois	53.1
Oklahoma-Kansas	54.7
Texas inland	55.4
Texas Gulf	43.9
Louisiana Gulf	38.1
Arkansas-Louisiana inland	43.3
Rocky Mountain	55.7
California	34.4
Total United States	46.0

MORE SPECIAL REFINERY FEATURES

appear in this issue on the following pages:

Technical and operating section starts Page 73.
Pictures of refinery operators start Page 88.
Refinery "Gadgets" section starts Page 122.
Personnel of refining companies in North America starts Page 157.
List of refineries in North America starts Page 181.

The importance of one refining area with respect to another could be judged by using other bases and most any kind of conclusion may be drawn but regardless of the base there will probably always be a wide distribution of plants. Justification for this is seen in the need to hold transportation costs to a minimum. This applies both to getting the crude to the plant and then getting the products to markets. An ideal refining situation is one in which the plant receives crude from the nearby fields and sells all of its products within a radius of a few hundred miles and in which the consumption is large enough to take the output of at least his 5,000-bbl. plant. A plant of this size or larger can usually economically

employ the more complex and technical processes for the manufacture of motor fuels and lubricants. A polymerization, alkylation, catalytic cracking, or solvent dewaxing unit can be more easily justified as well as the conventional combination of skimming and thermal cracking, cold pressing, etc.

The application of these processes in plants of 5,000-bbl. crude capacity or higher refers more specifically to the refineries which manufacture gasoline as the chief product. This in contrast with the many western Pennsylvania refineries whose principal product is lubricating oil.

Fewer But Larger Plants

Authorities who have suggested the 5,000-bbl. capacity as the economic minimum for the inclusion of such complex processes may appear high at first but it should be remembered the average operating refinery in the United States has a daily capacity of 10,000 bbl. This average is derived by simply dividing the 4,500,000-bbl. approximate capacity shown of all operating plants by the 453 plants in operation.

Since 1935 the trend in refinery operations has been definitely in the direction of fewer but larger plants. This will probably be continued until a balance is reached between the cost of transporting the products from a large centrally located plant and the cost of operating many units at scattered points.

Lower rail rates, water transportation and gasoline pipe lines which may operate in conjunction with trucks to deliver products from distribution stations along the line, all tend to hold refining activities within the oil-producing states where the great bulk of the smaller plants are located.

In contrast, technological changes of a complex nature such as the application of catalytic cracking, alkylation, destructive dehydrogenation, etc., tend to favor the construction of large refineries and in some instances definite advantages accrue to the plants located in industrial centers outside the oil country. This is because the operation of these highly specialized processes usually favors the production of valuable byproducts and as the complex synthesis of motor fuels is expanded, it is very probable that facilities will be provided for recovering many industrial chemicals or supplies. Most recently, the Standard Oil Co. (New Jersey) announced its interest in the manufacture of buna rubber from petroleum and we already see the close-working arrangement in the Chicago refining area where large quantities of cracked gases are delivered by a refinery to a chemical plant for the manufacture of alcohols, antifreeze materials and solvents. Similarly, large joint operations are in progress near Baton Rouge, La., near Los Angeles and one is planned near Houston.

Refineries in the United States receive 71 per cent of the crude oil by pipe line, 26 per cent by boat and only 3 per cent by truck and tank car. During periods of flush production in a new oil field the latter means of delivering oil to local refineries tends to increase but is no longer an important factor in the industry

This then raises the question whether there will be an ever-increasing demand for motor fuels which can only be made by some such complex process or combination. The answer cannot be safely made now but if the current trend of mounting motor-fuel octane values is a suggestion of what is to continue for a while, it is likely that for the next 5 years at least, we may expect the industry to continue to move in direction of operating fewer but larger refineries. At the same time, the combined capacity of all plants is likely to continue upward indefinitely.

Adjustment Period

Possibly it will take much longer than 5 years in which to make the adjustment and before the total oil consumption of the country can justify the building of additional plants on anything but a replacement or modernization basis. Also, the building of entirely new and separate refineries will, no doubt, be retarded by the constant expansion of the established large units which will try to supply the increasing market to the point where delivery costs on the products overcome the advantage.

As was stated previously, the posting of lower freight tariffs, the extension of gasoline pipe lines and the greater use of water transportation, all coupled together to get the products from the refinery to the consumer, now favor the expansion of the existing facilities over the erection of additional plants.

This procedure is in contrast with practices in the past. The principal factor to influence the building of new plants or expanding the old was the price at which crude oil was available.

At any time a new oil-producing field was discovered, the suggestion was automatically presented that a refinery be erected in the area to connect the crude into marketable products. As long as the consumers of petroleum products were willing to accept the natural products of the crude oil as they were distilled from the oil, the building and operation of skimming plants in such areas was a relatively simple, low-cost adventure. As the field developed and crude began to be plentiful, the local skimming plant was usually able to get a substantial price concession on the crude it guaranteed to take.

In the past few years, conditions have worked against such an arrangement. Now, the ordinary skimming plant can not sell its gasoline in open

REFINERY OPERATIONS IN NORTH AMERICA SEGREGATED ACCORDING TO PLANT LOCATION

State—	No. of plants	Daily crude capacity (bbl.)	Daily cracking capacity (bbl.)	No. of plants operating	Crude capacity operating plants	No. of plants shut down	Crude capacity plants shut down
UNITED STATES							
Alabama	1	4,000	.....	1	4,000	..	.....
Arkansas	6	38,250	11,500	6	38,250	..	.....
California	87	961,010	367,600	71	836,760	16	124,250
Colorado	10	16,855	5,900	8	15,675	2	1,180
Delaware	1	3,500	.....	1	3,500	..	.....
Georgia	1	4,000	.....	1	4,000	..	.....
Idaho	1	2,000	1,250	1	2,000	..	.....
Illinois	20	197,700	88,810	20	197,700	..	.....
Indiana	8	240,250	120,600	8	240,250	..	.....
Kansas	20	169,700	82,940	20	169,700	..	.....
Kentucky	9	42,150	20,500	8	41,900	1	250
Louisiana	15	214,600	105,000	14	209,600	1	5,000
Maryland	3	47,500	51,500	3	47,500	..	.....
Massachusetts	2	55,600	53,700	2	55,600	..	.....
Michigan	26	89,300	18,900	25	88,800	1	500
Minnesota	1	1,500	.....	1	1,500	..	.....
Missouri	2	22,300	6,260	2	22,300	..	.....
Montana	35	38,420	13,300	32	37,145	3	1,275
Nebraska	5	4,350	700	5	4,350	..	.....
New Jersey	9	231,700	153,900	9	231,700	..	.....
New Mexico	9	8,100	2,980	9	8,100	..	.....
New York	7	66,700	18,400	7	66,700	..	.....
Ohio	14	150,965	79,300	12	150,400	2	565
Oklahoma	30	237,050	111,250	21	200,500	9	36,550
Pennsylvania	32	313,650	120,250	32	313,650	..	.....
Rhode Island	2	12,500	1,650	2	12,500	..	.....
South Carolina	1	5,000	.....	1	5,000	..	.....
South Dakota	3	430	.....	3	430	..	.....
Tennessee	1	150	.....	1	150	..	.....
Texas	110	1,372,320	716,700	96	1,339,700	14	32,620
Utah	4	9,300	8,000	2	9,000	2	300
Virginia	1	2,000	.....	1	2,000	..	.....
Washington	1	2,200	1,100	1	2,200	..	.....
West Virginia	3	9,000	5,000	3	9,000	..	.....
Wisconsin	1	5,000	2,500	1	5,000	..	.....
Wyoming	25	55,118	22,100	23	54,418	2	700
Total	506	4,634,168	2,191,600	453	4,430,978	53	203,190
CANADA							
Alberta	14	*17,000	7,500	14	*17,000	..	.....
British Columbia	4	22,800	3,400	4	22,800	..	.....
Manitoba	4	2,450	700	3	2,200	1	250
New Brunswick	1	*300	.....	1	*300	..	.....
Northwest Territory	2	*400	.....	2	*400	..	.....
Nova Scotia	1	20,000	12,500	1	20,000	..	.....
Ontario	7	49,100	28,600	6	51,000	1	600
Quebec	6	*64,800	35,500	6	*64,800	..	.....
Saskatchewan	16	15,700	5,100	16	15,700	..	.....
Total	55	*192,550	93,300	53	*194,200	2	850
MEXICO							
Total Mexico	13	115,945	21,100	13	115,945	..	.....

*Estimated.

competition unless it happens to be located in an area where the crude has unusual high antiknock characteristics. These locations are quite rare east of the Rockies.

Furthermore, the antiknock requirements of automobiles are increasing. Straightrun gasoline coming from a skimming plant today may prove to be satisfactory when used in the car built today, but that gasoline could fall short when tried in the car engine to be built next year.

The trend in octane requirements is suggested in the following table which shows the average octane value of regular-grade gasoline sold each winter at the same company stations throughout the middle western states. Test results are based on the L-3 method.

1931	60
1932	61
1933	65
1934	67
1935	68
1936	68
1937	70
1938	72
1939	73

As the octane requirements of motor fuels mount, the skimming plant can buy tetraethyl lead to blend with its gasoline or crack a portion of its gasoline, distillates or residuum. Later, it might need to do both in order to most economically meet the octane requirements. In fact, that is the position the great bulk of refiners have occupied for several years. In meeting the competition which every refiner is witnessing, some have chosen to add more lead to their gasoline, others have chosen to polymerize a portion of their production, others will crack catalytically, while others have worked out combinations of these Most recently, alkylation has been added to the effective and economical means to raise the octane value of refinery motor-fuel production, and another decidedly important contribution to the art of making high-octane motor fuels is the commercial manufacture of neohexane on the part of the Phillips Petroleum Co., at its Borger, Tex., refinery. The process utilizes products recovered from natural gas, as well as oil distillates, to produce a product within the boiling range of ordinary gasoline, so that blending with light fractions is not necessary. The octane value of the product is 92 and has an unusually high lead susceptibility so that for all practical purposes it is comparable to a blending material of 115-octane value.

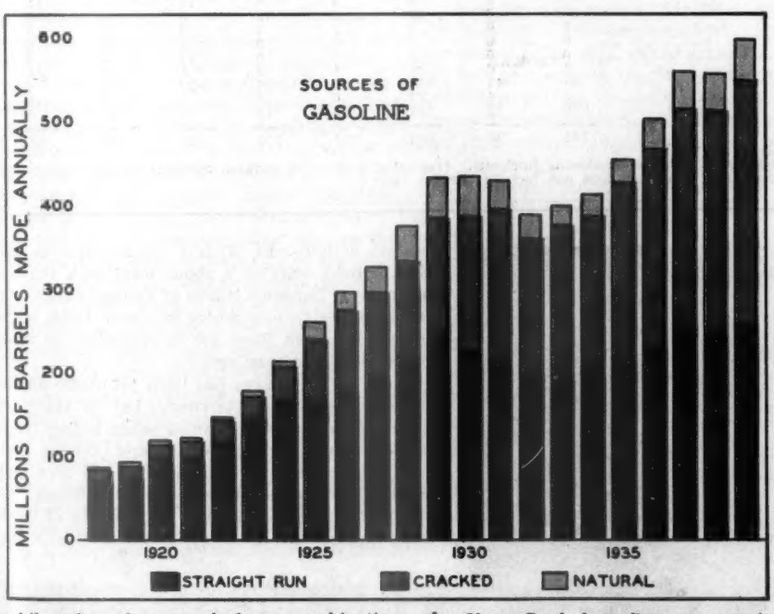
For the time being, the refining industry is capable of filling the needs of airplanes as well as automobiles so far as high-octane fuels are concerned and with the above processes at hand, there need be no fear of refiners failing to satisfy the demands of automobile and airplane-engine designers. However, it should be remembered that a 90-octane motor fuel costs more to make than a 70-octane and the engine designer must determine the overall economy of continuing to raise engine compression ratios.

While refiners have geared their operations to motor-car demands, they are cognizant of the growing needs of the airplane. Gasoline of 87-octane value or higher is generally required for use in modern planes. This is above the demands of the modern motor car but the fact modern airplanes find it most economical may point the way toward what might be expected of ordinary motor fuels in the future.

Growth of Refinery Capacity in United States

	Number of refineries	Total crude capacity (bbl. daily)	Number of operating refineries	Capacity of operating refineries (bbl. daily)	Total cracking capacity (bbl. daily)
1914	176	.....	...	.....	.....
1918	267	1,186,155	...	.....	.....
1919	289	1,295,115	...	.....	.....
1920	373	1,530,565	...	.....	.....
1921	415	1,888,800	...	.....	.....
1922	479	2,164,050	325	1,854,590	.....
1924	574	3,046,790	362	2,549,490	.....
1925	584	3,033,682	385	2,680,052	(*)
1926	515	3,068,340	356	2,770,340	980,960
1927	462	3,224,307	328	2,964,427	1,245,980
1928	456	3,426,330	315	3,116,930	1,327,584
1929	463	3,719,550	341	3,454,250	1,487,950
1930	479	3,972,460	362	3,721,360	1,705,299
1931	500	4,164,080	397	3,913,180	1,844,609
1932	510	4,093,370	383	3,665,830	1,954,550
1933	567	4,125,250	424	3,696,410	1,823,521
1934	628	4,243,033	483	3,790,593	1,838,420
1935	687	4,281,694	496	3,815,470	2,126,620
1936	640	4,301,754	479	3,936,535	2,130,800
1937	603	4,277,860	471	4,038,010	2,172,330
1938	562	4,511,160	451	4,301,910	2,327,215
1939	560	4,461,120	465	4,191,055	2,108,025
1940	506	4,634,168	453	4,430,978	2,191,600

*Not available previous to 1926.



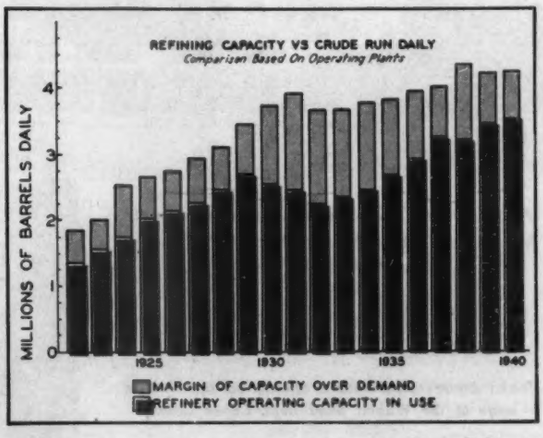
Above: Cracked gasoline now accounts for more than half the total gasoline made. Its growing importance is graphically shown. Improvement in the recovery of natural gasoline during the past 10 years also becomes apparent

Right: Despite improved volume outlet for its products and the processing of more crude oil, the refining industry has been holding down expansion of its total crude capacity to a figure more in keeping with actual needs. Expansion of manufacturing facilities to increase capacity will be growing concern over the future if the trend toward higher oil consumption continues

Aviation Gasoline

At present only about 0.6 per cent of the gasoline consumed in the United States is for use in airplanes. This represents but 120,000,000 gal. annually but the value of this production is relatively high and the demand is growing at a fast pace. Some indication of this demand comes from the recently published figures showing passenger miles flown by commercial airlines. Their business over the past 6 months has shown a 40 per cent increase and with the completion this week of an entire year in which no life was lost as a result of their services, the stage is all set for a very substantial increase in business during 1940.

In addition to this, substantial orders for 100-octane fighting-grade fuel is likely to come from Europe if air combat is intensified as predicted. United States refineries have ample equipment to fill all needs for aviation gasoline of all grades both here and abroad and could step up production to keep pace with plane manufacture if the demand should arise.



Activity in North Texas Area Approaching Record High

By D. H. STORMONT

WICHITA FALLS, Tex., Mar. 25.—With a backlog of 30 new fields or producing horizons resulting from a widespread exploration campaign during 1939, the North Texas area is one of the most active in the state as operators proceed to develop the new discoveries. And, apparently unsatisfied with the record-breaking number found last year, wildcatting and leasing activities are more intensified than at any time in recent years. At present interest is centered in Montague County, where two large producers recently opened new fields, and in Archer, Clay and Cooke counties.

Not since the spring of 1938, when development of the K.M.A. field was at its height, has activity been at such high levels. At the first of this month there were 192 rigs drilling in the 11 counties of the district, and an additional 181 operations were listed as active locations or rigging up. On May 1, 1938, the total number of operations was 430, but at no time since has the present total of 373 been exceeded. Sparked to a substantial extent by increasing activity in the Hull-Silk field of north Archer County, monthly completions in the area have shown an almost constant increase for the past year. Completions so far this year are running about 40 per cent higher than at this time a year ago—with the number tending to increase from week to week.

In the 11 counties of the district a total of 67 deep wildcats are drilling or are staked for immediate drilling, the great majority being contracted to depths of 4,000 to 5,000 ft. Though scattered throughout the area, as shown by the accompanying table, most of the tests are located in counties having substantial production, or in which new production was found last year. Some half-dozen wildcats have been staked as the result of the latest two discoveries in Montague, and as several of the large blocks assembled include drilling contracts, it is expected several more will be staked in the near future.

The area as a whole so far this year has enjoyed the highest allowable since the advent of proration in Texas. Following an 18,000-bbl. increase over the January quota, the district's total daily allowable during February averaged about 120,000 bbl. At the first of this month the district's allowable was set at 123,858 bbl. daily, but since then several allowable increases have been granted to fields so that the present total is around 125,000 bbl.

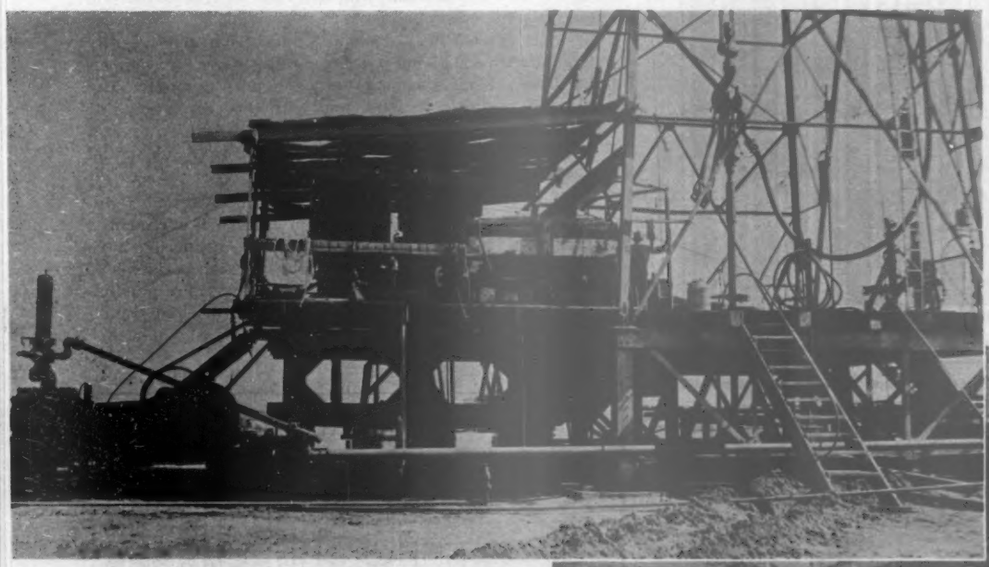
As the accompanying table shows, practically all of the North Texas counties have gained in activity, but with most of the increase taking place in Archer, Clay, Cooke and Montague counties. Since 20 of the 30 new producing horizons opened in the area last year were in these four counties, it might be expected that they would lead in activity. In Wichita County, due to the K.M.A. field, activity is about level with that of a year ago. The same is true of Young County, but in Wilbarger County where two new fields were opened last year, there are 23 operations as compared with 10 a year ago.

North Texas always has been primarily an independent operators' territory, but in the past year several major companies began taking large blocks and drilling exploratory tests. During 1939 new companies continued to enter the area and those already active increased their holdings. In the past 4 weeks, following the opening of deep Bend production near the town of Bonita, in

SUMMARY OF ACTIVITY IN NORTH TEXAS

County—	Rigs-Loc. Mar. 1940	Rigs-Loc. Mar. 1939	Drilling wells Mar. 1940	Drilling wells Mar. 1939	Completions Feb. 1940	Completions Feb. 1939	New discov. 1939*	No. deep wildcats†
Archer	33	8	31	17	49	30	6	12
Baylor	2	0	3	1	4	1	1	2
Clay	25	3	15	4	19	12	6	11
Cooke	38	4	22	8	12	8	4	9
Foard	1	0	1	1	1	2	0	2
Hardeman	0	0	2	0	0	0	0	2
Jack	6	5	8	10	5	14	2	4
Montague	9	0	16	4	2	5	6	11
Wichita	45	44	50	43	36	29	0	4
Wilbarger	3	4	20	6	11	7	3	2
Young	19	12	24	29	13	17	2	8
Total	181	80	192	119	152	125	30	67

*Includes new fields and new producing horizons. †Includes ½-mile or greater outposts to proven production, drilling tests and locations; does not include shallow tests.



Above: Drilling rig in the Hull-Silk field, currently the most active in North Texas

Right: Large diesel rotary drilling on the eastern edge of the Walnut Bend field, Cooke County

Montague County, leasing and blocking activities began accelerating. When a second deep Bend producer was indicated near Ringgold 2 weeks ago, these activities became more vigorous and during the past week independents and major companies literally scrambled for acreage. Although the leasing activity is primarily centered in Montague County, it is tending to spread into neighboring counties with several large acreage deals being turned in Wise and Clay counties. Unlike in the past though, major companies are setting the pace with several companies having three or more land men busily engaged in buying acreage. Reflecting the tone of the campaign is the fact that some rank wildcat acreage has been turned for as much as $15 per acre.

New Discoveries

Discovery well near Bonita was that of Sinclair Prairie Oil Co. on the A. P. Howard lands, ¾ mile west of the town. The pool opener was drilled in late in February, flowing 430 bbl. of 39-gravity oil in 3 hours through casing on its initial gage. Early in March on final Railroad Commission test the producer gaged 254 bbl. in 3 hours. Production is from a broken sand and granite wash pay of the Bend series at a depth of 5,241-49 ft. The wildcat was drilled on a high in the deep lime, indicated by seismograph, but failed to show production possibilities in the Canyon or Strawn series, which were topped low, other than an oil-stained sand at 4,725-33 ft. Sinclair Prairie is now drilling a west offset to the producer and has staked location for a south offset.

Second Bend discovery for Montague this year was G. Bland Omohundro's No. 1 W. B. Seay, 3½ miles south of Ringgold, which last week gaged 240 bbl. of 47.8-gravity oil in 3 hours on Railroad Commission test. This wildcat likewise topped the Canyon and Strawn series low and offered little production possibilities so that when it made a spectacular showing upon drilling in, it provided a major surprise. Top of the Bend was called at 5,654 ft. and saturation at 5,690-5,704 ft., the pay section being identified as Arkosic conglomerate by some geologists. The Ringgold discovery in opening new production established a record producing depth for North Texas, previous deepest production being the one-well Ross field of western Clay County opened by Continental Oil Co. and others December 11, 1939.

First Bend production opened in Montague County was in December of last year when Stanolind Oil & Gas Co.'s No. 2 Davis in the Rogers field was completed for 1,920 bbl. at 5,225-49 ft. The two recent discoveries therefore tend to establish its production potentialities over a large area. Thus wildcatters will have chances of opening production in the Strawn series, the underlying Bend and the Ellenburger—in addition to the ever-present possibilities of shallow production.

The leasing activity taking place in Montague, Wise, and Clay counties is a trend play along the flanks of the Red River uplift and at the mergence of the Bend arch with this uplift. The Red River uplift, which is mainly a buried mountain range, rises in Foard County; swings eastward along the general course of the Red River through Wilbarger, Wichita, and Wise counties; extends across Cooke from the northwest to the southeast corner, where it enters Denton County. The Fort Worth syncline extends northward from Tarrant and Dallas counties, through Wise and the southeast corner of Montague County, and in Clay County marks the southern boundary of the Red River uplift and the northernmost reflection of the Bend arch.

The two recent discoveries in Montague County are believed lie well down in the syncline, either on the flank of the structure or on secondary structures. It is the opinion of some geologists that the long axis of the smaller folds which form a controlling element in production will lie roughly parallel with that of the main uplift. Thus, leasing activity mainly is trending in a southeast direction from central Clay County through southwestern and central Montague into northern Wise County.

Previously discovered Bend production in North Central Texas from the Smithwick and Marble Falls has generally been small in areal extent. The pay in the Bonita and Ringgold discoveries is different in type from previous discoveries in northern counties in that it is a broken sand and conglomerate rather than lime pays. Thus. the play has become widespread on the basis that areal extent of the pays will be extensive or other fields will be opened on the flank trend. Some operators taking part in the activity estimate that as many as 20 wildcats will be staked in the next few weeks, after drilling blocks have been completed and operators start evaluating their holdings.

In east central Clay County leasing activity picked up last week as the result of the showing made by an abandoned and capped wildcat. The test was abandoned late in 1938 at a total depth of 6,354 ft. after the operator perforated and tested several showings farther up the hole, none of which were believed to be of commercial value. When the well was uncapped last week it made a short flow, so that it is expected that the hole will be cleaned and swabbed in an effort to determine the course of the oil. The wildcat was the Walter Gant's No. 1 Edward in the S. C. Beldon Survey, Abstract 12, about midway between the towns of Ringgold and Henrietta.

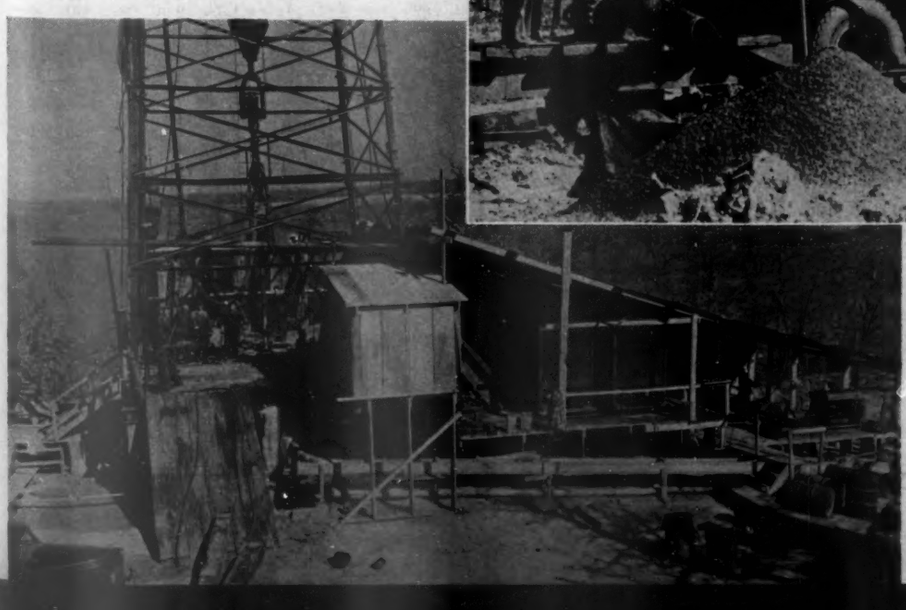
Aside from these two discoveries, which may prove to be as important as any opened in North Texas last year, new discoveries this year are lagging behind in number. The two Montague County pools are the only ones of consequence opened so far this year, while at this time a year ago eight discoveries had been marked up.

Proven Areas Maintain Activity

In proven areas drilling is being maintained at about the same level as a year ago in the older fields, with the increased activity being a reflection of the amount of new work taking place in the 1939 discoveries. Several of the fields opened in the latter part of 1939 entered this year as one-well pools due to lack of pipe-line outlets or other reasons. In several of these fields, mainly those in Clay County, additional tests are being drilled. These, of course, will require other offsets in many instances, so that development of deep production in this county may reach substantial proportions by midyear.

Activity in the Hull-Silk field of Archer County has steadily increased since the midyear of 1939 until its weekly completions and number of wells actually drilling exceed those of the nearby K.M.A. field. Due to the extent to which twinning of wells is being carried out, either twin wells to the 3,800 and 4,300-ft. Strawn pays, or shallow wells with the Strawn producers, activity is expected to remain at near the present level for several months to come.

Above: Swabbing in a large producer in the Benton & Holmes field of Montague, which flowed 45 bbl. naturally in the first hour



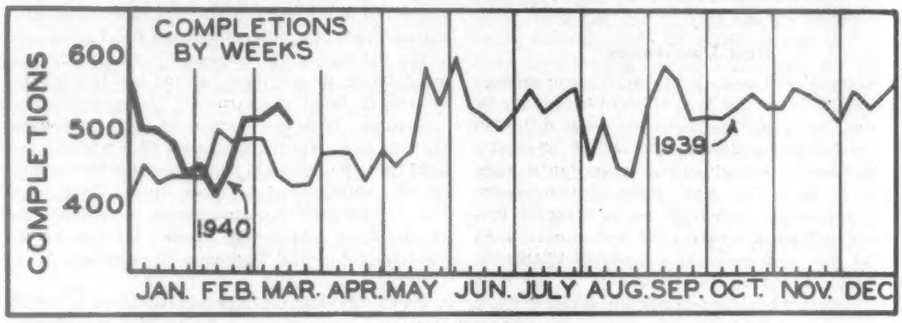
Left: This view shows the hilly topography of the Walnut Bend field. Site for this rig had to be dug into the hillside

Drilling Activity Is Showing Increase

By HARRY F. SIMONS

THE large number of discoveries made during 1938 and 1939 are resulting in increased drilling activity this year which may approach previous peaks. The accompanying table shows that 1,698 oil wells were completed in February, representing an increase of 26 per cent over February 1939. The total number of oil wells drilled this year is 3,378 or an increase of 19 per cent over the first two months of 1939. Much of the rise in February completions is due to the rapid drilling up of the Devonian pay in Illinois. February's completions are not, however, far above the average for the past 48 months.

Considering individual areas, abnormally high activity is found in the eastern fields and in Michigan and Illinois, with Mississippi showing up as a developing area. Generally speaking, the Mid-Continent area shows a corresponding decline, particularly in eastern Texas where the 4-year average stands at 154 wells per month, with only 28 current completed producers. Kansas, however, is showing a slight comeback over last year but has not yet reached its 4-year average.



Completions show that with the exception of the recent bad weather, 1940 activity is ahead of last year

New Flush Production

Initial productions of wells are running generally above average, showing that much of the drilling is in partially developed flush fields. This is particularly true of Illinois whose peak average of 1,304.8 bbl. per well does much to raise the average figure. Noteworthy declines in average initial production are registered by Kansas, Oklahoma and New Mexico.

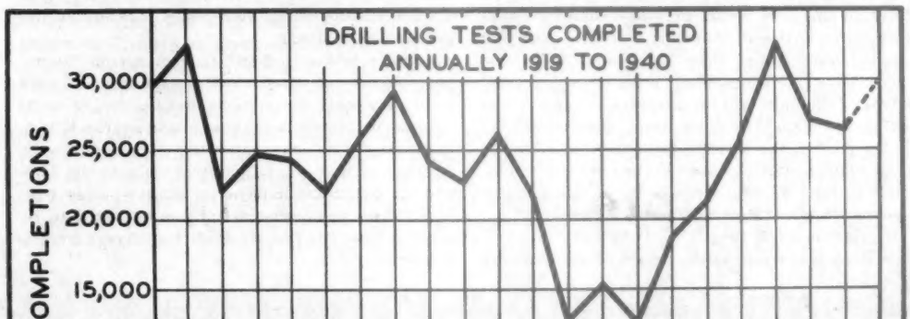


Chart shows that if present activity continues there will be nearly 30,000 completions during 1940

The rate of completion of dry holes furnishes a fairly accurate index of wildcatting activity. As would be expected from present prices and the fact that much semiproven acreage is being drilled, the figures for February show a pronounced decline from the average for the past 4 years. Of the total decline from average of 132 wells, Kansas and Oklahoma account for 67, showing the effects of the Illinois development on activity in these states.

Fewer than average gas completions are also recorded, although 1940 shows an 18 per cent increase in gas well completions over 1939.

Total completions to the week ending March 16 are 669 more than to the corresponding date in 1939, representing an increase in total activity of 13 per cent.

COMPARATIVE DRILLING ACTIVITY

	Oil wells					Av. initial prod.			Dry holes					Gas wells					Rigs	Drlg.
	Feb. 1940	Feb. 1939	Ave. 48 mo.	To date 1940	To date 1939	Feb. 1940	Feb. 1939	Av. 48 mo.	Feb. 1940	Feb. 1939	Av. 48 mo.	To date 1940	To date 1939	Feb. 1940	Feb. 1938	Av. 48 mo.	To date 1940	To date 1939	Feb. 1940	Feb. 1939
Eastern	401	169	259	744	393	1.6	2.2	6.9	15	17	29	55	43	67	50	66	138	100	637	287
Ohio	20	9	16	28	14	17.0	7.8	21.6	13	18	26	32	44	24	31	36	51	65	161	125
Michigan	75	56	50	135	90	225.7	663.3	456.7	25	31	31	69	70	4	2	8	7	3	206	151
Indiana	8	1	7	25	4	90.5	592.0	99.7	8	5	8	17	9	3	1	4	6	5	70	39
Illinois	256	201	133	399	460	1,309.8	209.5	273.2	39	39	25	71	80	3	3	1	6	6	470	350
Kentucky	14	15	29	28	28	47.1	82.8	63.2	10	12	20	21	39	5	11	10	7	6	147	105
Tennessee	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	....
Georgia	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	3	....
Florida	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	6	2
Alabama	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	4	1
Mississippi	6	....	1	15	....	678.3	....	620.8	2	....	2	6	....	....	....	....	....	....	29	8
Arkansas	9	13	11	19	34	434.4	483.1	582.3	3	6	5	8	14	....	....	....	....	1	42	33
North Louisiana	22	20	34	45	38	89.1	233.3	415.3	5	7	12	21	25	7	3	10	14	11	61	72
Gulf Louisiana	52	36	30	116	71	353.0	247.1	429.7	12	29	15	24	45	....	2	1	....	3	160	108
Gulf Texas	69	92	92	140	165	283.3	298.3	409.1	21	20	23	43	36	1	7	4	4	14	133	122
East Texas Border	2	2	14	3	10	10.0	117.5	385.0	3	....	2	4	1	....	....	1	....	1	11	13
East and Central Texas	28	53	154	65	166	82.2	72.8	58.6	2	4	15	10	16	6	4	2	12	5	79	54
W. Cent. and N. Texas	140	100	121	298	206	431.1	429.0	389.9	70	83	91	149	139	4	2	4	11	5	525	348
South Texas	117	177	159	241	302	119.7	139.2	186.1	62	62	62	129	107	4	8	8	12	13	245	233
West Texas	140	132	156	315	278	940.0	860.9	829.6	10	18	19	21	29	....	....	1	....	1	352	316
Texas Panhandle	41	16	39	78	42	340.8	377.0	462.8	49	3	2	4	8	4	2	10	11	4	139	95
New Mexico	51	38	45	112	78	386.6	699.6	672.6	7	4	5	24	11	2	....	2	5	1	157	133
Oklahoma	76	76	116	144	130	251.1	171.7	399.5	6	47	52	92	92	8	7	10	21	14	326	316
Kansas	86	64	108	160	113	286.7	381.5	668.2	14	25	37	31	43	4	3	7	7	5	236	171
Missouri	....	....	....	....	....	....	....	....	2	....	1	2	....	....	....	....	....	....	3	....
Nebraska	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	12	3
Wyoming	8	6	8	16	12	829.3	959.3	664.4	1	3	3	8	9	1	....	1	3	....	66	65
Montana	7	6	10	14	14	119.9	120.8	86.5	2	1	3	4	5	....	....	2	3	1	36	51
Colorado	....	....	1	....	1	....	....	429.6	....	2	1	....	5	....	....	....	....	....	26	40
Utah	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	4
Arizona	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	7	....
Iowa	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....
California	*77	*61	*81	*149	*137	538.7	667.2	708.2	4	8	23	6	29	....	....	....	....	....	....	....
Total	1,698	1,243	1,503	3,278	2,759	432.1	312.2	346.7	383	445	515	870	900	147	136	198	327	276	4,217	3,235

*Includes gas wells.

Ickes Wants U. S. to Police Wasteful Oil States

KILGORE, Tex., Mar. 27.—Federal regulation of the petroleum industry is needed to coordinate the oil and gas conservation activities of the states, Secretary of the Interior Harold L. Ickes declared tonight in an address broadcast from a banquet of the Kilgore Chamber of Commerce in commemoration of the tenth anniversary of the discovery of oil in the East Texas field.

As this was the seventh anniversary of Mr. Ickes' first speech on oil, made at the governors' conference in Washington, the secretary reviewed the history of East Texas production and efforts of state and federal governments to regulate production during the past 7 years. He drew the moral that stability of the oil industry rests on adequate government regulation and declared:

"What I said at the governors' conference in 1933 still holds true today—that it was in the public interest, as well as in the interest of royalty owners, landowners, and labor to stabilize the industry; that it was necessary to stop the evasion and the loss of state revenues; and that it was important to prevent the destruction of the oil industry. The crux of the whole critical situation was the lack of compliance with the oil-conservation laws in several of the larger oil-producing states and the want of such laws in other states."

Referring to current litigation over Texas proration orders, he said: "I hope that the state will work out a just method by which sound engineering practices, consistent with the principle of conservation, will be employed in the solution of this problem. It seems to me that for the best interest of all concerned the allowable should be always determined by the capacity of the field to produce without waste. This would prolong the effective life of the field for many years. It would be an injustice to every citizen of East Texas to destroy present social values in this area simply to force oil onto the market. Neither the home market nor the foreign market increases the capacity of the field by one barrel."

Turning to the pending Cole bill, Mr. Ickes denied he wants to be an oil dictator and asserted that he has never assumed that he had the right to dictate to any state. The Cole bill is patriotic because it is in defense of the nation's resources and there is nothing in it of a communistic nature, Mr. Ickes declared, chiding Governor Phillips of Oklahoma for "dragging out an old and smelly red herring" in his testimony that the Cole bill is a step in the direction of collectivism. Opponents of the Cole bill imitate parrots in monotonously claiming there is no such thing as a waste of oil, Mr. Ickes said, asking if this is so why do enlightened oil men want conservation laws in Illinois and California? "I regret to say that my home state of Illinois has hogged the market by reason of its geographical position and has not only been profligate but also antisocial in adding burdens to other oil communities that are seeking orderly development," he said.

"The answer to these inequities and iniquities, it seems to me, is the need for national standards of production. I have urged the passage of state oil and gas conservation laws, but that is not enough; we must also have federal law to coordinate the oil and gas conservation activities of the states. It would be a mistake to set aside the state conservation laws. What is needed is a coordination of these laws with a view to the welfare of the whole nation. An attempt in that direction has been made in the Cole bill now pending in Congress. Unfortunately, this bill has been damned up and down by state officials and associations of the oil industry.

"When I appeared before the Cole committee in support of the bill, I said that if the committee and Congress could find any better way of conserving oil and gas than is proposed in the Cole bill, I would be happy to give it my support. I am still ready to support any means that will effectively conserve oil and gas.

"Those in the oil industry who oppose the bill do so because they want to run their own business in their own way, regardless of the effect upon the public interest. Certain elements in the oil industry know that an effective way to hamper the cause of oil conservation is to spread the malicious propaganda that the state and federal forces are enemies of the oil business and want to grab power for themselves. This is wilful misrepresentation.

"There are people who persist in charging that, if the Cole bill should pass, it would mean that federal officials and agencies would supersede local ones in regulating the production and supply of petroleum. This is not the intention, and if there is any language in the Cole bill that is doubtful in this regard I am willing to have it clarified. The purpose underlying the Cole bill is that of cooperation, just as we have cooperated with the states under the Connally Act.

"It is even more surprising to me that people in the oil industry should express opposition to the Cole bill than that state officials should do so. Sometimes the latter are unnecessarily overanxious about some improbable encroachment upon their prerogatives. But oil industrialists are supposed to be a hardheaded group of business men. Most of them already are willing to go so far as to uphold the principle of prevention of waste in oil production. I venture to say that every oil industrialist is in favor of this unless he is taking oil out of a pool regardless of what proportion of it may justly be regarded as his own. So the straight-shooting oil producer favors an oil-conservation law that is enacted by the state. But what is he going to do when a state neglects or refuses to enact such a law to the injury of his industry as a whole?

"If he has any regard for his own interests he will support some such bill as that introduced by Congressman Cole. Just as the oil industry is wider than any state, so is the question of the conservation of oil more than a state interest, especially if states refuse to check the reckless exploiter. Some companies have been charged with wanting proration and conservation in places where they are at a disadvantage or where they need protection from unscrupulous persons.

(Continued on Page 63)

U. S. Supreme Court Enjoins Ethyl Jobber Licenses

WASHINGTON, D. C., Mar. 25.—In a decision which opens the way for Asst. Atty. Gen. Thurman Arnold's antitrust drive against alleged monopolistic control of business through patent licenses, the Superme Court today upheld the New York District Court in enjoining Ethyl Gasoline Corp. from continuing its system of jobber licenses.

The court held that protection of public health against lead poisoning would be adequately protected by refiner licenses and other means and that the jobber license is a device which has been and is capable of being used for other and illicit purposes.

The Government contended in the suit that jobber licenses were used to restrain trade and maintain resale prices. Despite the company's denial, the Supreme Court upheld the trial court finding that the company controlled the price policies of licensed jobbers.

In discussing the application of the patent law, the court, in opinion by Justice Stone, said a patent license may not be used to enlarge the limited monopoly granted in the patent itself and may not condition his license so as to tie to the use of the patented device or process the use of other materials outside the subject matter of the patent, nor to control the conduct of the licensee.

By its sales to refiners, Justice Stone said, the Ethyl corporation "relinquishes its exclusive right to use the patented fluid and it relinquishes to the licensed jobber its exclusive rights to sell the lead-treated fuel by permitting the licensed refiners to manufacture and sell the fuel to them. And by the authorized sales of the fuel by refiners to jobbers the patent monopoly over it is exhausted, and after the sale neither appellant nor the refiners may longer rely on the patents to exercise any control over the price at which the fuel may be resold.

"The picture here revealed is not that of a patentee exercising its right to refuse to sell or to permit his licensee to sell the patented products to price-cutters. . . . It is one in which appellant has established the marketing of the patented fuel in vast amounts on a nationwide scale through the 11,000 jobbers and at the same time, by the leverage of its licensing contracts resting on the fulcrum of its patents, it has built up a combination capable of use, and actually used, as a means of controlling jobbers' prices and supressing competition among them.

"It seems plain that this attempted regulation of prices and market prices of the jobbers with respect to the fuel purchased, for which appellant could not lawfully contract, cannot be lawfully achieved by entering into contracts or combinations through the manipulation of which the same results are reached by the exercise of the power which they give to control the action of the purchasers.

"Such contracts or combinations which are used to obstruct the free and natural flow in the channels of interstate commerce of trade even in a patented article, after it is sold by the patentee or his licensee, are a violation of the Sherman antitrust act."

STATE CAPITALS...

TEXAS

TEXAS' APRIL OIL ALLOWABLE will be set at 1,443,773 bbl. daily Railroad Commissioner Jerry Sadler announced on Monday. This allowable represented a decrease of 35,748 bbl. from the total set forth in the commission's March proration when the basic figure of 1,479,521 bbl. was set. Granting of pleas for increased production by various fields during the month, however, raised the gross allowable to the present record figure of 1,566,877 bbl. daily. Thus the April figure provides a reduction of 123,104 bbl. from the current allowable. The production order was signed by Mr. Sadler and Chairman Lon A. Smith, but Commissioner E. O. Thompson did not sign the order as he felt "we should adhere strictly to the Bureau of Mines figure of 1,332,000 bbl. a day for April."

The East Texas field would be granted a 14,000-bbl. increase daily, Mr. Sadler said, through being shut in only 12 days during the month as compared with 13 holidays this month. This will increase the field's daily average production to 415,000 bbl. during April. The remainder of the state will be cut about 25,027 bbl. daily, he stated, and in addition fields would be required to shut down 1 day during the month or curtail their output the equivalent of 1 day's production. Thus, with the exception of East Texas and a few other fields, Texas fields will lose the equivalent of 1 day's production as compared with their current allowables.

Fields in which reduction will be made from their March allowable and the amount of the cuts in barrels per day are: Esperson dome, South, a 450-bbl. cut; Alice, 900; Aransas Pass, 2,282; Colorado, 400; Conoco Driscoll, 2,121; Longhorn, 835; Minnie Bock, 729; Plymouth, 3,513; Reynolds, 1,039; Richard King, 249; Taft, 1,059; Tom Graham, 675; Turkey Creek, 3,974; East White Point, 3,280; Van, 3,000; Wasson, 6,755. Fields increased over their current allowable were: Angleton, up 150 bbl.; Tomball, 4,718; Avoca, 220; Griffin, 261; and Harper, an 885-bbl. increase.

The commission ordered all Texas fields shut in for 24 hours on April 1.

AT THE STATE-WIDE PRORATION HEARING held last week majority of operators agreed that the market had not materially suffered from the high production of the current month, but felt that production should be held to Bureau of Mines estimated market-demand figures. There was also a unanimous opinion of the operators present that no increases be granted fields without a hearing, and that no changes be made in allowables after the figure had been set for the month. While warnings against continuing the present high level of flow were sounded, numerous requests for allowable increases were registered. Some operators, anticipating the cut next month, contented themselves with pleading against reductions. This was especially the case of several who this month obtained allowable increases.

OKLAHOMA

OKLAHOMA CORPORATION COMMISSION April 3 will give a hearing on a petition of the Forest Producing Corp. for flooding permit on four tracts, comprising 770 acres in Nowata County.

At this time leases are averaging 0.4 bbl. of oil per well per day, the petition cites. The leases are in Sections 31-26-17, 36-26-16, 6-25-17 and 1-25-16.

WELL SPACING and other drilling regulations for the new Cumberland oil area of Marshall County will be delayed by the state Corporation Commission until after March 29, when the U. S. War Department will be permitted to intervene in the case if it desires.

Preliminary hearing was held on the Pure Oil Co.'s petition for 20-acre spacing Friday afternoon, after Curtis Harris, attorney representing Capt. Lucius Clay, War Department engineer in charge of the Denison Dam project, asked for continuance of the case to permit the War Department and attorney general to study the case.

KANSAS

THE NEW PRORATION PROGRAM for the Hugoton gas field in Southwest Kansas will not go into effect April 1 as had been ordered by the Kansas Corporation Commission. The Kansas Supreme Court granted a modification of the injunction orders of the Stevens County District Court and set for hearing at its April session further consideration of the proration proceedings.

ILLINOIS

THE U. S. SUPREME COURT on Monday submitted to Illinois state courts the question of ownership of oil and mineral rights along the right-of-way of the Missouri-Illinois Railroad Co. in the Salem oil field in Marion County, Illinois.

Justice Black delivered the unanimous opinion that granted a railroad petition to have oil removed and the proceeds impounded until settlement of the ownership controversy.

The tribunal reversed a ruling by the eighth federal Circuit Court that the railroad owned only a right-of-way for railroad purposes.

Claims to the oil underlying the right-of-way also were presented by the Magnolia Petroleum Co. and the Ohio Oil Co.

NELS H. SMITH was elected governor of Wyoming last November by the largest majority given any governor in the state. Born August 27, 1884, at Gayville, S. D., he moved to Wyoming in 1907 and started a ranch and farm in Crook and Weston counties, becoming a successful farmer and raiser of high-grade cattle. He has served in the state legislature and as a member of the state Highway Commission

IN A BITTER VERBAL EXCHANGE, which is being reflected in editorial comment in the most prominent newspapers in the state, Governor Horner charged Lieut. Gov. John Stelle, a candidate for the Democratic gubernatorial nomination and an outright opponent of proration of oil production, with placing "a dead hand upon constructive and adequate oil legislation to provide the necessary revenue that would have enabled Illinois to match and receive its full share of social-security grants-in-aid from the federal government for old-age assistance and dependent children."

The governor's charge against Stelle brought a wave of editorial comment, headed by a front-page statement on March 19 in the Chicago Daily News, published by Col. Frank Knox, Republican vice-presidential nominee in 1936.

Captioned "Summon the Legislature," the editorial read: "The governor leaves no room for doubt of his conviction that treatment of the oil problem, created by the tremendous development of Illinois fields in recent months, is imperative. . . . Aside from what Horner says about Stelle, this conclusion, we think, is correct. The subject of oil proration is acute and demands immediate attention. There is only one body competent to deal with that subject—the state legislature."

LOUISIANA

AT A MEETING LAST WEEK in Shreveport, the directors of the Independent Petroleum Association of America, North Louisiana section, voted to name a committee of five men to confer with Governor-designate Sam Jones to the end of improving the oil industry in Louisiana. The incoming governor, who was elected on a reform platform, defeating the Long administration, has expressed himself willing and anxious to confer with oil associations and oil men in an effort to provide better administration of the industry in the state after his assumption of office. The committee will be named shortly, and will confer with Mr. Jones on his return to the state, following a vacation.

CALIFORNIA

THE NEW-WELL COMMITTEE of the Central Committee of California Oil Producers recently completed a survey that indicated that operators expected to complete 823 wells and recomplete 264 others during 1940.

ARKANSAS

MAY 6 IS THE DATE set for trial before a three-judge federal court in El Dorado of the Lion Oil Refining Co.'s suit against the Arkansas Oil & Gas Commission. The suit contests the state allocation order of February 24, as it applies to allocation of production in the Jones sand of the Schuler field, Union County.

TEMPORARY FIELD RULES were issued for drilling Blossom and Paluxy horizons in the Fouke field, in which the discovery well is still exploring deeper horizons. The field rules are contingent on the completion of five wells and the holding of a hearing in Texarkana. Production allocation will be 5 bbl. per acre per day or 100 bbl. daily for wells completed in the Blossom and Paluxy horizons, and 200 bbl. daily for possible wells completed in the lower Glen Rose of Smackover formations. Spacing regulations will follow a pattern drawn up by commission engineers, whereby each well drilled to the Paluxy formation will be spaced on a 20-acre staggered basis. In the event deeper production is discovered, permits will be issued for drilling in the centers of the respective 40-acre units.

The OIL AND GAS JOURNAL

PRODUCING REFINING NATURAL GASOLINE PIPE LINE

Published weekly by The Petroleum Publishing Company at Tulsa, Oklahoma

The Second Quarter

With the second quarter of the year to start within a few days, every producer and refiner and state conservation official should now give special attention to the production, inventory, and price charts with supporting data which appear regularly in this publication.

The first quarter showed substantial improvement in many ways over the same period last year. These gains may be consolidated and expanded over the rest of the year provided those who produce and refine the industry's raw material and those who establish the state allowables in its production, heed the warning signals.

In the month now closing, the crude-oil production exceeded the Bureau of Mines' estimated demand by at least 10,000,000 bbl. Crude runs to stills, which under known conditions should have been curtailed, were not.

The results of these two operations are clearly apparent. In recent weeks there has been a substantial increase in crude-oil inventories for the first time in nearly a year.

Gasoline stocks have continued to climb when they should have been leveling off preliminary to the spring and summer periods of withdrawals. Fuel oil, distillates, and gas oil have lost a part of their previous strong statistical position.

Turning to markets, there have been reductions in prices of representative products in refinery, wholesale and retail sales. Other products have not shown the recovery that was to be expected.

All this has happened in the face of the most satisfactory first-quarter demand that the industry has known in practically all products. The increase in domestic consumption of burning oils has been phenomenal and the total demand for gasoline, despite an unfavorable export situation, is running around 5 per cent higher than the same period last year.

Many in the producing branch have displayed no concern over the refined market situation, pointing out that the crude-oil market generally is designated as firm.

There also is assumption that this situation will continue indefinitely, notwithstanding the lessons of the past, which have demonstrated that a satisfactory crude-oil market cannot be maintained in the face of an over-expanded refinery production and declining quotations for finished products.

The crude-oil market has been benefited by an exceptionally large increase in domestic consumption of refinery products. While all indications point to a record demand for the year, it is certain that the percentage of increase during the first quarter will not be maintained.

Another factor in the recent crude demand has been the desire of some companies to add to storage, a development which certainly will be temporary. There are still excess crude stocks in the tanks of other companies which they desire to liquidate during the year.

The season of maximum demand for burning oils and fuel oils, which has been the major factor in the increased outlet for crude oil over the past 6 months, has ended. The decline in these outlets for the next several months means excess inventories, unless there are adjustments in production.

There probably is room for argument as to just what maximum stocks of gasoline should be at this period of the year but everyone agrees that the present inventories of more than 100 million barrels are excessive and should be reduced substantially within 60 days.

There is no mystery as to the significance of these figures. Neither should there be any confusion among operators as to what should be done over the immediate future in adjusting operations in line with current and assured demand trends for the second quarter.

Pipe-Line Activity

Southeastern Gasoline Line Hearings By Georgia Highway Board

ATLANTA, Ga., Mar. 25.—The state Highway Board last week opened a hearing on the question of allowing natural-gasoline pipe lines to be run under state highways. Multiple litigation has been pending in state and federal courts, instituted by southern railroads opposing the construction of the Southeastern Pipe Line Co. line.

Over 500 citizens from all sections of the state attended the hearing at which A. Steve Clay, president of the Southeastern Pipe Line Co. represented the company and Judge Arthur Powell and Phillip Alston of Atlanta represented the railroads.

Mr. Clay introduced delegations from various counties along the proposed line who said it would increase business in their sections and reduce unemployment. He offered in evidence letters from 140 members of the house of representatives and 38 members of the senate refuting the charge by opponents of the pipe line that the bill passed by the 1939 general assembly giving pipe lines the right of eniment domain "was slipped through the general assembly." He also said the letters coming from more than two-thirds of the members of the general assembly favored permits for the completion of the line.

A petition had been presented to Superior Court Judge W. W. Mundy in Paulding County, asking that the Highway Board be enjoined from assuming jurisdiction. Later the injunction proceeding, which is to be heard April 2, was modified to permit the hearing.

Judge Powell, speaking for the railroads, said: "Attorneys for the railroads are appearing here under protest and without waiving any of their legal rights. We hold that the Highway Board has no authority to act in this matter."

Atty. Gen. Ellis Arnall recently ruled that the Highway Board has authority to grant or deny permission to the pipe-line company to lay lines under the highways unless they are considered a hazard to public safety.

Testimony that the gasoline pipe lines are not dangerous if they are constructed and operated "in conformity with the best practices" was offered at the hearings by E. V. Foran of Texas, consulting petroleum engineer. He pointed out that if it were not for the pipe lines of Texas citizens of Georgia would be paying 5 cents per gallon more for their gasoline and added that in his opinion the construction of the Georgia line would lower gasoline prices here.

Mayor Thomas Gamble of Savannah, Ga., speaking for the pipe line, said that the loss of business incurred by the proposed line would impair the Savannah port, increase unemployment, reduce taxes, and be harmful otherwise to his city.

The hearing will be resumed at 10 o'clock on Thursday, March 28.

Michigan Gas Transmission To Lay 53 Miles of Line

Bids for construction of a natural-gas line from Montezuma, Ind., to the Crawfordville, Ind., station, were received at Detroit March 25 by Michigan Gas Transmission Co. The contract will call for 53 miles of 24-in. line.

Magnolia Lets Contract For Beaumont Line

HOUSTON, Tex.—Magnolia Pipe Line Co. has let contract to Williams Brothers Corp. for loops along its Mirando-Luling-Beaumont trunk system. Five loops totaling 57 miles of 8-in. line will be built between the Sealy station in Austin County and Beaumont to increase the capacity from 23,000 to 30,000 bbl.

Bemis-Burnett District to Obtain New Outlet

The Bemis-Burnett district in Ellis and Rooks counties, Kansas, was assured a new outlet March 22 when Stanolind Pipe Line Co. let the contract for a 134-mile line to a connection at Washington, Kans., with the company's line from Wyoming to Freeman, Mo. Cost will be approximately $1,350,000.

Contract for the western end from Bemis to the Solomon River, near Beloit, was awarded to Fredell Construction Co., Houston, and D. W. Gordon, Denver. O. C. Whitaker, Fort Worth, and Brown & Root, Inc., Texas contractors, received contract for the eastern half from the river to Washington. Local labor will be utilized, contractors having arranged to employ wherever possible residents of the counties through which the line passes.

The line will consist of 7 miles of 8-in. and 127 miles of 10-in. running in a generally northeastward direction to Washington. It will have a daily capacity of from 10,000 to 12,000 bbl., there being no intermediate pumping stations planned.

Work will begin when weather permits, with completion expected early in the summer. Pipe has been on the ground since March 1, but letting of the contract was delayed nearly 30 days until weather conditions became more favorable.

This will be the fourth outlet for the district including the Bemis-Cress, Burnett and Shutts pools. The Stanolind company has a 6-in. line running southeastward from Bemis, and a parallel 4-in. line from Shutts. These lines and the new artery will be interconnected. The other outlet is the Consolidated Pipe Line Co.'s 5-in. line from the Burnett pool in Rooks County to the new refinery at Phillipsburg, Phillips County.

Magnolia Seminole Line Scheduled to Operate

FORT WORTH, Tex.—Operation of the Magnolia Petroleum Co. trunk line serving the Seminole pool of central Gaines County, is scheduled to start next week. The pool has been without a pipe line since its discovery in January 1937. At last reports, there were 40 producers in the area, which is being developed on a 40-acre spacing pattern.

Two gathering systems serve the Magnolia trunk line. Magnolia has constructed a 26-mile 8-in. welded trunk line, which will handle oil gathered by the two systems. The line has been constructed from a field booster station near the center of Section 291, 1 mile south of the Seminole townsite, and thence south to NW NW Section 17, Block A-46, P.S.L. Survey, in Andrews County, where it connects with the Atlantic line Hobbs-Midland 8-in. carrier.

Refinery News

McNutt Oil Contracts for New Desulfurization Unit

EL PASO, Tex.—Cecil E. McNutt announces the completion of an agreement and license with Perco, Inc., Bartlesville, Okla., for the installation of a catalytic desulfurization unit. The unit is being built as an integral part of the Brickland, N. M., refinery and will process high sulfur gasoline stocks to reduce sulfur and simultaneously greatly improve clear and leaded octane numbers.

Gulf's New Isooctane Unit Practically Completed

HOUSTON, Tex.—Gulf Refining Co.'s new $1,000,000 isooctane plant at Port Arthur is practically completed and will be given test runs this week. The unit is designed to produce daily approximately 15,000 gal. of isooctane, which will be blended with high-quality gasoline to produce aviation fuel.

This final product will have an octane rating—a measure of fuel efficiency—of nearly 100, compared with that of between 70 and 80 for ordinary automobile gasoline.

Inland Empire Refinery To Install U.O.P. Unit

CHICAGO.—Inland Empire Refining Co. of Spokane, Wash., has signed a license agreement with Universal Oil Products Co. and will install a U.O.P. catalytic polymerization unit with a rated capacity of 500,000 cu. ft. Design and specifications will be furnished by Universal and it will be built by Lang Co., Salt Lake City.

Inland Empire is running 2,000 bbl. a day from the Cut Bank, Montana, field, and cracking about 1,000 bbl. a day. D. F. Gerstenberger is general manager.

Refineries Purchasing More Electric Power

The consumption of utility electric power on the part of oil refineries has increased from 573,463,000 kw.-hr. in 1929 and 1,400,160,000 kw.-hr. in 1938 or an increase of 145 per cent. This occurred while the increase in crude runs amounted to only 21 per cent.

New Refinery at Meraux, La., Running 5,000 Bbl. Daily

Crude runs at the new General Oil Corp. refinery at Meraux, La., near New Orleans, are being maintained at 5,000 bbl. daily. Completed a little more than a month ago, the plant is equipped to manufacture naphtha, tractor distillate and diesel fuels.

Natural Gas

Louisiana-Nevada and State To Appeal From Ruling

LITTLE ROCK, Ark.—The state Utilities Commission and the Louisiana-Nevada Transit Co. of Ada, Okla., planned an appeal to the Arkansas Supreme Court from a ruling by Circuit Judge Lawrence C. Auten that the company could not distribute natural gas in Southwest Arkansas.

Natural Gasoline

Natural Gasoline Production Declined During January

The production of natural gasoline declined materially in January 1940, according to a report prepared by the Bureau of Mines. The daily average in January was 5,786,000 gal., compared with 6,056,000 gal. in December 1939. The most outstanding decreases in January were in the Seminole, East Texas, and Kettleman Hills districts.

Stocks increased in January, totaling 187,992,000 gal. on the thirty-first, compared with 185,682,000 gal. on hand December 31, 1939, and 191,814,000 gal. on January 31, 1939.

Dr. Charles K. Francis, 1875 - 1940

DR. CHARLES K. FRANCIS, technical editor of The Oil and Gas Journal and internationally known petroleum technologist, died suddenly at his home in Tulsa, Monday, March 25. While not fully recovered from a recent illness, he had been in his office as usual that day preparing copy for his department, "Questions on Technology."

The broad basis on which Dr. Francis built a life of scholarly attainment began with graduation from Brown University, Providence, R. I., where he received his bachelor's degree in chemistry in 1899. He served as an instructor at Brown and then in 1902 and 1903 was a member of the faculty of Georgia School of Technology. He obtained his master's degree at Brown in 1904, after which he taught chemistry in Converse College, South Carolina; the University of Illinois, and University of Missouri. In the last-named institution he received the degree of doctor of philosophy in 1910, moving then to Stillwater, Okla., where he was professor of petroleum technology in Oklahoma A. & M. College and also chemist at the Agricultural Experiment Station. He remained in Stillwater until 1917, when he moved to Tulsa to enter the practical work of the oil refinery.

Served Various Refiners

Dr. Francis served successively as chief chemist for Cosden & Co. (now Mid-Continent Petroleum Corp.), manager of refineries and chemical director for Transcontinental Oil Co., chief chemist and technical superintendent for Cosden & Co., vice president in charge of manufacturing for Producers & Refiners Corp., and chief technologist for Skelly Oil Co. While with Skelly, Dr. Francis joined the staff of The Oil and Gas Journal in 1926, and he remained in its service until his death.

From 1920 to 1924 he was a member of the advisory committee of the Federal Specifications Board. In 1925 he served as president of the Oklahoma section of the American Chemical Society, as a councilor in 1926, and for 3 years was state chairman of essay contests in the organization.

Dr. Francis was a fellow of the Institute of Petroleum of Great Britain. He was a delegate to the World Petroleum Congress in Paris in 1937 and served as honorary chairman of the section on the science of physics, chemistry, and refining. He was cochairman and active head of the scientific committee of the International Petroleum Exposition, Tulsa.

DR. CHARLES K. FRANCIS

He was largely responsible for the establishment of a Scientific Building at the 1938 Tulsa exposition and had been engaged for several months in arranging for the exhibits to be shown at the May exposition this year.

Dr. Francis was born in Chester, Pa., but the family moved soon afterward to Richmond, Va., where his boyhood was passed. He married Miss Alma Lindner, of Richmond. Besides Mrs. Francis, he leaves a daughter, Mrs. James B. Diggs, Jr., and two sons, Charles K. Francis, Jr., and Thomas W. Francis, Tulsa; his father, Thomas Francis, Belmont, Mass.; two brothers in Providence, R. I., and a sister, in Belmont.

Funeral services were held Wednesday afternoon in Trinity Episcopal Church, Tulsa.

A.P.I. Issues Its Estimates Of Petroleum Reserves

THE American Petroleum Institute Committee on Petroleum Reserves estimates that proved petroleum reserves in the United States on January 1, 1940, totaled 18,483,012,000 bbl. This is 1,134,866,000 bbl. greater than on January 1, 1939, and is the result of having blocked out 2,399,122,000 bbl. of new reserves during the year,—2,058,455,000 bbl. through development in old fields and 340,667,000 bbl. through discovery of new fields. These figures include all grades of crude oil and distillate known to be recoverable under existing economic and operating conditions.

In Column 2 are listed changes which oil-field development during 1939 indicated as necessary in the estimates in Column 1. These revisions have resulted from extensions of known pools and from new data pertaining to reservoir conditions such as thickness and permeability of the pay zone, percentage recovery, etc.

In Column 3 are shown the proved reserves in new pools discovered in 1939, and the proved reserves discovered in that year in new producing horizons in the older, known pools.

Column 4 is the total of Columns 2 and 3 and represents the proved reserves discovered and developed in 1939.

It should be emphasized that the estimates in this report refer only to reserves already proved by drilling. Pools tested by only one or two wells have been assigned relatively low reserves which may be considerably augmented by later development. The ultimate magnitude of the reserves in the new pools will not be known until their respective productive limits are completely outlined. This may not occur for a period of years. As an illustration of this, it is pointed out that additions in reserves of pools discovered in 1938, make up a considerable portion of the revisions in older pools, which are shown in Column 2 of the report of January 1, 1940.

These figures do not include any estimate of the reserves which may be found in areas known to be favorable to the accumulation of oil but as yet untested.

As in the past this committee wishes to emphasize the fact that every effort has again been made to secure a fair, unprejudiced and representative opinion. Each member in his district appointed a number of subcommittees to gather and study the necessary data. The factors pertaining to the various pools were examined and adjusted in the light of new information.

ESTIMATED PROVED PETROLEUM RESERVES IN THE UNITED STATES

(Barrels of 42 gal.)

State—	Proved reserves as of January 1, 1939 (1)	Revisions in proved reserves (incl'g extensions) in fields known on January 1, 1939 (2)	Estimated proved reserves in new pools and new prod. horizons discovered in 1939 (3)	Proved reserves discovered and developed in 1939 (Col. 2 + 3) (4)	Production* during 1939 (5)	Proved reserves as of January 1, 1940 (Col. 1 + 4 less 5) (6)
Arkansas	188,246,000	144,270,000	8,775,000	153,045,000	21,143,000	320,148,000
California	3,188,763,000	521,433,000	46,500,000	567,933,000	224,354,000	3,532,342,000
Colorado	17,713,000	3,840,000	.....	3,840,000	1,391,000	20,162,000
Illinois	242,847,000	189,393,000	43,698,000	233,091,000	94,302,000	381,636,000
Indiana	6,031,000	99,000	9,477,000	9,576,000	1,443,000	14,164,000
Kansas	613,230,000	149,549,000	23,411,000	172,960,000	60,723,000	725,467,000
Kentucky	37,545,000	10,622,000	1,500,000	12,122,000	5,581,000	44,086,000
Louisiana	1,040,256,000	139,532,000	87,306,000	226,838,000	93,869,000	1,173,225,000
Michigan	42,749,000	30,515,000	613,000	31,128,000	22,799,000	51,078,000
Montana	104,471,000	—5,050,000	.....	—5,050,000	5,961,000	93,460,000
New Mexico	703,252,000	266,000	20,973,000	21,239,000	37,323,000	687,168,000
New York	40,490,000	.....	.....	.....	5,098,000	35,392,000
Ohio	26,358,000	7,470,000	1,020,000	8,490,000	3,156,000	31,692,000
Oklahoma	1,162,370,000	43,324,000	17,530,000	60,854,000	160,072,000	1,063,152,000
Pennsylvania	200,460,000	.....	.....	.....	17,337,000	183,123,000
Texas	9,447,764,000	732,070,000	73,064,000	805,134,000	484,527,000	9,768,371,000
West Virginia	24,468,000	25,000,000	.....	25,000,000	3,580,000	45,888,000
Wyoming	261,133,000	65,900,000	.....	65,900,000	21,417,000	305,616,000
Miscellaneous†	.....	222,000	6,800,000	7,022,000	180,000	6,842,000
Total United States	17,348,146,000	2,058,455,000	340,667,000	2,399,122,000	1,264,256,000	18,483,012,000

*These are U. S. Bureau of Mines figures. †This includes Mississippi, Nebraska, Tennessee, Missouri, and Utah.

Research Reports a Feature Of A. A. P. G. Meeting

By W. V. HOWARD

THE research committee of the American Association of Petroleum Geologists, under the leadership of A. I. Levorsen, will hold a number of important conferences at the Stevens Hotel, Chicago, on the afternoon and evening of April 9.

It is the practice of the committee to hold a dinner on the evening preceding the regular meeting of the association, followed by a round table discussion of some important phase of petroleum research. This year, soil analysis will be the subject under discussion. Papers will be presented by Eugene McDermott, Dallas, Tex., and E. E. Rosaire, Houston, Tex. Shorter presentations of certain phases of soil analysis will then be made by R. H. Fash, Fort Worth, Tex., and John Merritt, Tulsa. After a short intermission, the meeting will reconvene and it is hoped that questions, both written and oral, will be asked all of the speakers, or of members of the audience who may be able to contribute to the discussion. In this way, the whole question of geochemical exploration will be reviewed and there will be plenty of oportunity to hear of specific instances where the method has been tried and the degree of success that has been obtained.

At 2 o'clock, April 9, five conferences on research topics and four conferences on specific undertakings will convene for discussions. These will continue throughout the afternoon. These groups are headed by members of the research committee, as follows:

Sedimentation and reservoir rocks.—Leader: E. Wayne Galliher, Barnsdall Oil Co., Los Angeles, Calif., assisted by F. W. Rolshausen, Humble Oil & Refining Co., Houston, Tex.; W. C. Krumbein, University of Chicago, and John C. Miller, Texas Co., Houston, Tex.

Oil-field waters.—Leader: L. C. Chase, Gulf Oil Corp., Tulsa, assisted by Ralph H. Fash, Fort Worth Laboratories, and Howard S. Bryant, Skelly Oil Co., Tulsa.

Origin and Evolution of Oil.—Leader: Monroe G. Cheney, Anzac Oil Corp., Coleman, Tex., assisted by W. P. Rand, Gulf Oil Corp., Pittsburgh, Pa.

Migration and accumulation of oil.—Leader: F. M. Van Tuyl, assisted by Ben H. Parker, both of Colorado School of Mines.

Relation of oil analyses to stratigraphy—Leader: N. W. Bass, U. S. Geological Survey, Tulsa.

In addition to these scheduled conferences, other subcommittees will hold meetings during the convention, the exact time and place to be determined later. These subcommittees are:

Foreign geology.—Leader: Winthrop P. Haynes, Standard Oil Co. of New Jersey, New York.

Tectonic map of the United States.—Leader: Phillip B. King, U. S. Geological Survey, Washington, D. C., assisted by T. E. Weirich, Phillips Petroleum Co., Bartlesville, Okla.

The Permian System, special volume.—Editor: Ronald K. DeFord, Argo Oil Co., Midland, Tex.

Stratigraphic Oil Fields, special volume.—Leader: A. I. Levorsen, Tulsa.

Several prepared short discussions will be presented at the group meeting on origin and evolution of oil, including papers by Professor W. H. Twenhofel, University of Wisconsin; Eugene McDermott, Geophysical Service, Inc.; Parker D. Trask, U. S. Geological Survey, and Wendell P. Rand, Gulf Oil Corp. The latter two contributors will review informally some of the data and theories found in foreign and domestic literature on this subject, to be followed during the coming years by formal reviews. This conference group will welcome discussion at this meeting from others who are working on problems of origin and evolution of oil. It is to be hoped that greater interest and more contributions may result from this and subsequent conferences and that a brief annual report may be prepared for the bulletin of the association which will call attention to outstanding contributions on this subject from year to year.

Will Include Progress Reports

Several of these conferences will include progress reports on projects which have been under way for some time. The volume on stratigraphic oil fields was authorized by the executive committee of the association and is planned to cover some 50 fields in which the accumulation of oil has been governed by lensing or variations in porosity and permeability of sands. It will thus form a valuable addition to the association's earlier volumes on Typical American Oil-Field Structures.

The Permian volume, under the editorship of Ronald K. DeFord, will deal with the stratigraphy, geologic history and economic geology of the Permian and will fill a long-felt want in bringing our knowledge of this system up to date.

The tectonic map of the United States is a project of the Division of Geology and Geography of the National Research Council and will be of especially value to oil geologists who will be able to follow tectonic trends with more assurance after the completion of this study. The American Association of Petroleum Geologists may undertake the engraving, printing and distribution of this map.

Two other research projects of great value are also well under way, namely a study of the relationship between types of oil, as indicated by analyses, and stratigraphy, and a study of the time of formation of petroleum.

Research on Types of Oils

For years, geologists have worked on the theory that older oils are of higher grade than more recent oils. There are exceptions to this generalization, such as the black oil of the Embar formation of Wyoming, and the relationship is by no means definite among oils of nearly the same age. The existing relationships have often been used to provide evidence in favor of or opposed to certain theories of oil migration. In the absence of any detailed discussion of the problem as a whole, it has been possible to find examples which will suit almost any view and the committee's report will go far in dispelling some of the uncertainties and contradictions that now exist.

The time of formation and accumulation of petroleum is far from being an academic problem. Many structures containing excellent potential reservoirs are found to be barren. Many explanations have been advanced for this condition but one which can hardly be more than a hypothesis at present is that the oil formed before the structure was developed and that by the time there was a suitable trap, the oil had migrated elsewhere. The time of formation of structures can be worked out by subsurface geology with comparative ease, but little work has been done on the other half of the problem, the length of time that elapses between the deposition of a reservoir rock and accumulation in that reservoir. Professors Van Tuyl and Parker have gathered an enormous mass of data on this subject and have reduced this to a preliminary report of some 400 pages.

In addition to the conferences of the research committee and its subcommittees, the association is devoting a full afternoon on April 10 to "a symposium on new ideas in petroleum exploration." Following the papers, the meeting will be thrown open for open forum and discussion. The speakers and discussion will be keyed to the present and the future.

25TH MEETING NUMBER

A.A.P.G.—April 11

Issue of

The Oil and Gas Journal

J. Elmer Thomas, first president of the A.A.P.G., is the author of a comprehensive article entitled, "The Origin and Growth of the A.A.P.G." which will be a feature in this Anniversary Issue. In his exclusive contribution he traces the 25-year growth of the organization and discusses developments in petroleum geology which led up to the strong position which exploratory activities now have in the industry's operations.

Other features of this special issue include histories of the Society of Exploratory Geophysicists and the Society of Economic Paleontologists and Mineralogists, which will hold their annual meetings on the same date, namely, April 10 to 12, in Chicago, Ill.

Pictures and biographical sketches of the officers of the associations and societies will be included in the issue, as well as pictures of the past presidents of the A.A.P.G. and committee chairmen.

The Oil and Gas Journal's yearly feature of pictures of authors and abstracts of papers presented at the annual meeting will be carried in the usual complete manner.

Congress Asked to Probe Tanker Rates, Fuel Prices

By HENRY D. RALPH

WASHINGTON, D. C., Mar. 25.—Protests against the increased tanker rates on shipment of oil from Gulf ports to the eastern seaboard, and increases in fuel-oil prices, are having repercussions in Congress, and Rep. V. F. Harrington of Iowa has introduced a resolution to direct the House committee on merchant marine and fisheries to investigate the entire oil tanker and barge transportation situation.

Specially, the resolution would direct the committee:

"To make a thorough investigation of the ownership, operation, and practices of oil-tanker and oil-barge transportation agencies, and particularly:

"1. The ownership, registry, and operation of oil tankers owned by domestic corporations in international trade.

"2. The ownership, registry, and operation of oil tankers and barges engaged in coastal, river, and harbor trade.

"3. The transfer of oil tankers from United States registry to foreign registry and the effect on (*a*) the rates for transportation of oil by tankers; (*b*) the prices of domestic petroleum products; and (*c*) the prices charged merchant ships for bunker fuel.

"4. The chartering, leasing, or other hiring of oil tankers by their owners and the extent of such activity as between supposed competitors.

"5. The relations between producers, refiners, and marketers of petroleum products, and operators of oil tankers and barges, and the effect of such relations on (*a*) the independent nonintegrated producer, refiner, or marketer, and (*b*) the consumer of petroleum products."

Texas refiners were preparing to protest to the Interstate Commerce Commission that the heavy increase in rates has more than wiped out the differential between Texas coast and Atlantic seaboard prices.

The Temporary National Economic Committee has kept its eye on fuel-oil prices in connection with its general study of price increases, but at present has no plans for making a special study of this subject. The Harrington resolution has been referred to the House committee on rules which will probably be guided by the wishes of members of the merchant marine committee in deciding whether to recommend that the House order the investigation. No immediate action is expected, but if ship owners, other oil consumers, and various branches of the oil industry continue to complain about tanker rates the investigation may be ordered before the end of the session.

●

Import Quotas

THE BUREAU OF CUSTOMS has suspended the importation of petroleum from countries other than Venezuela, Colombia, and the Netherland West Indies, at the reduced rate of import tax provided in the Venezuelan trade agreement, and has ordered an investigation of these imports. At the same time the bureau announced that a total of 61,892,000 bbl. of crude petroleum, topped crude petroleum, and fuel oil may be imported during 1940 at the tax rate of ¼ cent per gallon provided in the Venezuelan agreement. This quota is 5 per cent of the runs of crude to domestic refineries in continental United States during 1939, reported by the Department of the Interior to have amounted to 1,237,840,000 bbl. Imports in excess of this quota must pay the tax of ½ cent per gallon. There is no change in the division of this quota among importing countries, namely, Venezuela, 71.9 per cent; Netherland possessions, 20.3 per cent; Colombia, 4 per cent; and other foreign countries 3.8 per cent. On the basis of the 1940 quota the percentage to "other countries," chiefly Mexico, would be 98,779,632 gal., and preliminary reports from the Bureau of Customs showed that up to March 9 these imports had already totaled 66,487,292 gal. Under the bureau order importers of petroleum from Mexico and other countries not having a special quota may enter their oil in customs bond or may withdraw it for domestic consumption by paying the full tax of ½ cent per gallon and filing a request for a refund. The exact purpose and nature of the investigation is not clear, but it is assumed that the bureau may seek to have the quota spread over a greater portion of the calendar year.

●

Domestic Gasoline Demand Up

THE daily average supply of domestic crude oil estimated by the Bureau of Mines to meet the market demand in April 1940 is 3,550,000 bbl. This is 49,400 bbl. (1 per cent) more than the estimated demand for March and 2 per cent above the actual demand for April 1939. This marks the first month since November 1939 that a gain in crude-oil demand has been forecast.

Daily average crude-oil production and runs to stills during the 4 weeks February 10 to March 9 were 3,769,000 and 3,489,000 bbl., respectively. During this period domestic-crude stocks increased 6,489,000 bbl., hence the daily indicated demand for domestic crude was 3,538,000 bbl., or only about 15,000 bbl. above the bureau's forecast.

Increases in the amount of Illinois crude marketed combined with weakness in the export market for crude petroleum and motor fuel have curtailed the markets for crude from the Mid-Continent and Gulf states. The April forecast of demand for Illinois crude is 215,000 bbl. daily above the actual of a year ago, compared with a gain in the estimated demand for the United States as a whole of only about 64,000 bbl. daily. The current rate of production in other states, if continued, will result in large additions to crude stocks or will stimulate refinery operations to a degree beyond the capacity of the market to absorb refined products.

The trends in motor-fuel demand for the second quarter indicate a possible domestic demand of 6 per cent above the corresponding period of last year, but smaller exports may reduce the gain in total demand to about 5 per cent. By March 31, the increased motor-fuel demand for the first quarter will not only have been met but finished and unfinished stocks will probably approximate 100 million barrels, or 13 million above the level of March 31, 1939. If this seasonal surplus is eliminated during the summer months it will provide two-thirds of the anticipated increase in total motor-fuel demand in the second and third quarters.

The demand for distillate fuel oil, exaggerated by abnormally cold weather, reached record levels in the first quarter, but should drop to a more normal level in the second quarter. In the areas east of California, fuel-oil demands in April must be met from current runs to stills because of depleted stocks. To attain a normal balance between supplies of motor fuel and other products, lower runs to stills than the current level with moderate gasoline yields and higher yields of other products seem to be essential.

The high level of winter runs to stills, the record accumulation of gasoline stocks, and a substantial reduction in exports preclude the usual sharp rise in the demand for domestic crude in the second quarter. Unless conditions change materially, no substantial increases over the figures forecast for April, either in runs to stills or in the demand for domestic crude, seem probable for either May or June.

The estimated domestic demand for motor fuel is 47,500,000 bbl., representing an increase of 8 per cent over the abnormally low demand of 43,977,000 bbl. in April 1939.

The estimate of exports of 2,800,000 bbl. is 863,000 bbl. less than the actual exports in April 1939.

Stocks of finished and unfinished gasoline on January 31 amounted to 90,975,000 bbl. Statistics of the American Petroleum Institute indicate that stocks increased 9,200,000 bbl. in February, bringing them to more than 100,000,000 bbl. as of February 29. The bureau estimates a decrease of 1,700,000 bbl. in finished gasoline stock during April.

TABLE 1.—ESTIMATED DAILY AVERAGE CRUDE-OIL DEMAND BY STATES (Barrels)

(As no changes in crude-oil stocks are involved in these estimates, they represent demand rather than production)

State—	Forecast— Apr. 1940	Forecast— Mar. 1940	Actual Apr. 1939
Texas	1,332,000	1,330,600	1,395,000
California	590,000	587,100	623,000
Oklahoma	413,000	420,300	465,000
Illinois	380,000	329,700	165,000
Louisiana	257,000	253,200	269,000
Kansas	151,000	153,900	167,000
New Mexico	100,000	103,200	115,000
Wyoming	66,000	60,600	70,000
Arkansas	64,500	65,500	49,000
Michigan	63,000	64,800	59,000
Pennsylvania	51,000	55,000	45,000
Montana	16,800	15,200	13,000
Kentucky	15,800	15,200	14,000
New York	14,900	14,700	12,000
West Virginia	11,000	11,000	9,000
Ohio	8,800	8,700	10,000
Indiana	7,800	7,100	2,000
Mississippi	3,900	1,300	.....
Colorado	3,500	3,500	4,000
Total	3,550,000	3,500,600	3,486,000

Benzol and direct sales of natural gasoline are estimated as 900,000 bbl., making refinery production 47,700,000 bbl. This is distributed among the various districts as follows (thousands of barrels): East Coast, 6,360; Appalachian, 1,990; Indiana-Illinois, 9,320; Oklahoma, 2,760; Kansas, 2,490; Inland Texas, 3,490; Texas Gulf Coast, 11,820; Louisiana Gulf Coast, 1,470; Inland Louisiana-Arkansas, 850; Rocky Mountain, 1,250; California, 5,900.

Runs to stills.—Natural gasoline to be blended at the refineries is estimated as 5.9 per cent of the total gasoline production, or 2,810,000 bbl. The yield of straightrun and cracked gasoline is estimated as 44.05 per cent. The application of this yield to the production of 44,890,000 bbl. of gasoline gives crude runs of 101,900,000 bbl., or 3,396,700 bbl. daily. Foreign crude runs are estimated as 2,600,000 bbl.

Crude-oil exports are estimated as 4,900,000 bbl., or 1,322,000 bbl. less than the actual exports in April 1939. Crude oil to be used as fuel and losses is estimated as 2,300,000 bbl.

Total demand.—The total demand for domestic crude oil in April, as indicated by the estimates above, is 106,500,000 bbl., or 3,550,000 bbl. daily.

DOALL contour machines set up for (left to right) cutting, filing and polishing. Inset: poppet lever sawed out of steel block and filed by DOALL. Courtesy Continental Machines, Inc., Minneapolis, Minnesota.

A GOOD IDEA ON PAPER BECOMES A WHIZ IN STEEL

● Last decade's development of alloys such as chromium and molybdenum made possible saw blades as narrow as 1/16-inch for cutting metal . . . gave promise of a gala comeback for the band saw—star of the lumber show at the World's Fair in '98. The idea of these new, tough, slender saws was good—on paper. How to make them actual cost cutters for the average shop was the problem.

For six years, the metal-cutting band saw went through the development mill. One improvement after another came until finally it seemed that the ideal model had been attained. It was made of seasoned castings. It worked perfectly. But it was still in the luxury class.

Then Doctors of Design went to work on the problem with *"Shield-Arc"* welded steel construction. They developed a rigid, strong, light-weight machine that produced more uniform work at less cost. (*The welded steel "Model V-16," does three times as much work as the "Model J" it replaces.*)

Result: This versatile "contouring" machine, now profitable for the average shop, is revolutionizing many machining practices for lower costs. A good idea on paper becomes a whiz in steel . . . and in sales.

"Shield-Arc" welding has turned good ideas into profits in thousands of similar cases—in manufacturing, construction and maintenance. Try this method of uniting design ingenuity with superior materials and see how it makes *your* products *stronger, more rigid, better looking* with savings in weight, time and money.* Counsel of experienced Lincoln engineers is yours for the asking. Phone the nearest Lincoln office or write THE LINCOLN ELECTRIC COMPANY, Dept. N-5, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

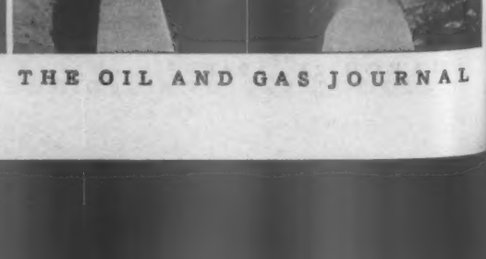
LINCOLN "SHIELD-ARC" WELDING

Unites design ingenuity with superior structural materials for progress.

THEY BOTH HAVE IT—Both *"Shield-Arc"* and *"Shield-Arc Jr."* Welders have Continuous Self-Indicating "Job Selector" (assuring the right TYPE of arc) and Current Control (assuring the right AMPERAGE) for lowest costs on every job. Get free bulletin on these New Lincoln Welders.

*** FOR EXAMPLE.** Standard steel shapes and pressed steel parts simplify production of DOALL machines. Eliminate patterns and expensive time-consuming steps. Accurate assembly by welding limits machining operations to a quick grinding. Result: Faster production. Lower costs.

TOUGH GOING on the 442-mile oil line of Utah Refining Co. was simplified by extensive use of "stove-pipe" welding. In flat country, some crews laid more than 11,000 ft. of line per day. Line crosses three mountain ranges. Courtesy H. C. Price Co. who used *"Shield-Arc"* Welding.



Western Petroleum Refiners Assn.

Program for Wichita Meeting

The Western Petroleum Refiners Association in its annual meeting this year is bringing before its members outstanding speakers who will discuss problems in banking, transportation, and business in general. The meeting is being held at the Allis Hotel at Wichita, Kans., March 31, April 1 and 2.

A paper on the octane problem will be presented at the Monday afternoon session. The paper, the result of cooperative effort of several of the oil companies, will be given by W. W. Scheumann, of Cities Service Oil Co. It will point out many of the handicaps under which the industry has been working, and will suggest that the octane is not as highly important as is generally believed. A special committee has been working on this subject for some months, and the paper will give to the membership much valuable information.

The program has been so arranged that part of each day will be devoted to technical sessions, and part to general sessions. The technical sessions will be held in the mornings, and the program as planned under the direction of the manufacturing committee will include discussions of the most pertinent current problems confronting refiners. The tentative program follows:

Sunday, March 31

Golf.—Crestview and Wichita Country clubs.

7-10:30 p.m.—Buffet supper (informal), compliments Ethyl Gasoline Corp., ball room.

Monday, April 1

9:30 a.m.—Technical Session.—W. M. Carney, Lion Oil Refining Co., El Dorado, Ark., presiding.

Introductory remarks, L. D. Mann, Cities Service Oil Co., Tulsa, chairman, W.P.R.A. manufacturing committee.

Tractor Fuels, Profs. C. W. Smith and C. L. Zink, University of Nebraska.

Title to be announced, Lummus Co., New York.

(Discussion from the floor will follow each paper.)

2 p.m.—General Session.—R. R. Irwin, Socony-Vacuum Oil Co. (White Eagle Division), Kansas City, Mo., presiding.

President's annual address. L. B. Simmons, Rock Island Refining Co., Duncan, Okla.

Appointment of committees.

Oil and Transportation, E. J. Engel, president, Santa Fe Railway, Chicago.

The Refiner's Will o'the Wisp, W. W. Scheumann, Cities Service Oil Co., Tulsa.

6:30-10:30 p.m.—Pioneer party, Wichita Country Club, compliments of supply and transportation companies.

Tuesday, April 2

9:30 a.m.—Technical Sessions.—R. W. Leslie, Skelly Oil Co., Eldorado, Kans., presiding.

Removal of Inorganic Salts From Petroleum, C. M. Blair, Tretolite Co., St. Louis, Mo.

Reforming, R. P. Mase, Mase-Turner Engineering Co., Tulsa.

(Discussion from the floor will follow each paper.)

2 p.m.—General Sessions.—R. W. McDowell, Mid-Continent Petroleum Corp., Tulsa, presiding.

Title to be announced, Laird S. Dean, president, Merchants National Bank, Topeka, Kans.

Title to be announced, W. J. Cameron, Ford Motor Co., Detroit.

Committee reports.

Committee on nominations.

Election of officers and directors.

Report of committee on resolutions.

Meeting of board of directors.

7 p.m.—Dinner dance (informal).

Wednesday, April 3

9 a.m.—Inspection trip, Socony-Vacuum refinery, Augusta, Kans. (Buses leaving Allis Hotel promptly at 9 a.m., returning 12:30 p.m.)

Ickes Wants U. S. to Police Wasteful Oil States

(Continued from Page 53)

"We would prefer states like California and Illinois to adopt oil conservation acts of their own. But if they refuse to do so, because of local pressure from selfish groups, then under the Cole bill federal officials would be able to step in and insist on procedures in the interest of the whole people. And if a state, having a conservation law, should nevertheless permit wasteful practices, then again federal officials could do what the state neglects to do. But in no instance would federal officials have any right or power to interfere if the states themselves properly supervised the production of their own oil resources.

"May I suggest that the small producer needs such cooperation more than the large one. The great integrated companies are fully able to take care of themselves. They need no help, either from the states or the federal Government. In some instances they have come to regard themselves as superior not only to the states but to the nation itself. The worst aspect of many of these big businesses is that they have no interest in or concern for the social and economic welfare of the state in which they may happen to operate because they are absentee-owned; controlled by great financial interests in New York and other centers of the North."

Tertiary Wilcox Pool Opened In Beauregard Parish, La.

HOUSTON, Tex.—Atlantic Refining Co.'s No. 1 D. A. Whitmer opened Tertiary Wilcox sand production in the Neal area, Beauregard Parish, coastal Louisiana, when it flowed an estimated 15 bbl. of 36.6-gravity oil per hour on a 4-hour drill-stem test.

Interstate Oil Compact Commission Called

Gov. Leon C. Phillips of Oklahoma, as chairman, has called a meeting of the Interstate Oil Compact Commission to be held at Oklahoma City April 5.

Oil Imports Protested by Alberta Association

CALGARY, Alta.—A statement issued by Herbert Greenfield, president of the Alberta Petroleum Association, discusses the effect upon Alberta petroleum industry of imports of gasoline and crude into the three prairie provinces, which, the association states, represent the natural market for Turner Valley crude and urges government action to conserve the prairie market for Alberta crude.

DEATHS

J. P. FLYNN, 68, Sistersville, W. Va., a director of Quaker State Oil Refining Corp. and Pennsylvania Grade Crude Oil Association, died suddenly at St. Petersburg, Fla., March 22.

ROBERT READ BERRY, advertising manager of Pennzoil Co., died March 15 in Los Angeles, following an operation.

CALVIN EDGAR REICHARD, 77, a native of Pennsylvania, veteran oil-well driller, died in Tulsa last week. He moved to Tulsa from West Virginia in 1911.

THE MARKETS*

CRUDE OIL: Production in the United States in the past week fell off 4,903 bbl. to 3,885,061 bbl. per day. Illinois production on which most of the attention of oil men is centered, declined to 446,521 bbl., a drop of 9,234 bbl. per day, and California's output declined 17,250 bbl. per day.

REFINERY: Gasoline unsteady in all coastal areas, but showing faintly improved tone at interior points. Low-priced material in eastern market believed to have originated in Mexico. Natural gasoline at lowest price recorded since 1934. Light fuels holding fairly well, and actually firmer in North Atlantic region. Kerosene and tractor fuels still gaining. Lubricating oils, after extended decline, appeared to be leveling off.

TANK-WAGON AND POSTED DEALER: Other large sellers followed the action of Atlantic Refining Co. in reducing tank-wagon prices of gasoline in Philadelphia. Socony-Vacuum reduced consumer tank-car price of gasoline in the Buffalo and Rochester districts of New York 0.5 cent and reduced dealer tank-wagon price at several points.

FINANCIAL: The oils closed a little higher than the week before, but their market movement was irregular. More new lows were recorded. Average of 30 representative stocks for week ended March 23: High, 25.94; low, 25.36; close, 25.69. Week ended March 16: High, 26.38; low, 25.52; close, 25.61.

*Detailed information in market section.

Company—		Net income	Earned per common share
Devonian Oil Co.	1939	$506,205	$1.57
	1938	551,801	1.71
Argo Oil Corp.	1939	59,068	0.08
	1938	391,388	0.52
Wilcox Oil & Gas Co.	1939	361,261	0.77
	1938	254,057	0.52
Tide Water Assoc. Oil Co.	1939	8,958,971	1.05
	1938	10,427,272	1.28
Venezuelan Petroleum Co.	1939	78,309	0.04
	1938	87,322	0.04
Margay Oil Corp.	1939	228,352	1.52
	1938	342,416	2.28
Standard Oil Co. (Ind.)	1939	34,142,642	2.23
	1938	27,771,976	1.62
Total 37 companies reporting*	1939	$154,477,714	
	1938	133,255,550	

*Thirty companies previously reported.

Strike at Mid-Continent Refinery Is Settled

The strike begun December 22, 1938, by members of the Oil Workers International Union (C.I.O.), at the West Tulsa refinery of the Mid-Continent Petroleum Corp., was ended March 21 following a series of conferences.

It was reported the terms provided that strikers not discharged by the corporation, numbering 309, will be returned to work on any job available with all seniority rights to which they are entitled, without discrimination; that as fast as vacancies occur strikers will be reinstated on the basis of length of service, experience and ability, and that cases of strikers who were discharged will be taken up within 60 days and reviewed by the management for those desiring a review, the National Labor Relations Board being asked to recess hearings in such cases for 60 days.

It was further agreed that if the employes cooperate with the corporation for a period of 6 months, at that time there will be another conference to draft a working agreement to adjust future disputes, with a proviso that the corporation shall not be bound except as required by the labor act.

Trucker Groups Oppose Rail Rate Reduction

TOPEKA, Kans.—The Topeka section of the Interstate Commerce Commission hearing on reduced rail rates on petroleum products opened last week with trucker groups assailing the cuts as "discriminatory." They contended the 30 to 35 per cent rate cuts on refined oil shipments between points in Oklahoma, Kansas, Colorado, western Arkansas and southwestern Missouri will "drive us out of business."

Railroads supporting the lowered schedules, say they need the reduced rates to regain lost traffic and that the rates are sufficient to produce profit.

PROGRAMS AND MEETINGS

N.P.A. Annual Meeting Program at Cleveland

The thirty-seventh semiannual meeting of the National Petroleum Association will be held at the Cleveland Hotel, Cleveland, Ohio, April 18 to 19. The topics for the group meetings have been carefully selected.

GROUP MEETINGS

Wednesday, April 17

6 p.m.—Executive committee, department fire and accident prevention.

8 p.m.—Western Pennsylvania Refininers Traffic Association.

Thursday, April 18

9:30 a.m.—Board of trustees.

10 a.m.—Department of manufacture: Synopsium on lubricants (speakers to be announced); automotive lubricants; Diesel lubricants; aeronautic lubricants.

Department of traffic and transportation (subject to be announced).

6:30 p.m.—Fellowship supper, Cleveland Hotel Ballroom. Entertainment hosts: Canfield-National-Sohio. Entertainment committee: Canfield Oil Co., H. M. Carruth and A. L. Bailey; National Refining Co., C. S. Smith and H. W. Kuegler; Standard Oil Co. of Ohio, A. M. Maxwell and M. R. Bower.

GENERAL SESSIONS

Thursday, April 18

2 p.m.—N. H. Weber, president, National Petroleum Association, address of welcome.

"The Interests of the Public, the Motor Manufacturers and the Oil Industry in Lubrication," R. A. Ludlow, director, A.P.I. lubrication committee.

"Americanism," Carl E. Bailey, governor of Arkansas.

"Lubricating Oil Market," J. M. Koch, director, sales and advertising, Quaker State Oil Refining Corp.

Friday, April 19

9:30 a.m.—Breakfast. C. L. Suhr, executive vice president National Petroleum Association, presiding.

"Can Germany Win?" a brief survey of the war, by Hanson W. Baldwin, military critic, New York Times. Discussion led by Prof. Henry M. Busch, Western Reserve University.

"The Octane Problem From the Automotive Viewpoint," J. B. McCauley, Chrysler Corp. Discussion led by J. B. Fisher, Kendall Refining Co.; E. B. McConnell, Standard Oil Co. of Ohio; W. S. Zehrung, Pennzoil Co.

A.I.M.E. Southern California Section to Hold Meeting

The American Institute of Mining and Metallurgical Engineers, southern California section, of which Harry P. Stolz is chairman, and Walter D. Abel, secretary-treasurer, will hold a spring dinner meeting in Los Angeles April 3 at the La Golondrina Cafe, 35 Olvera Street.

Herbert Hoover, Jr., president of the United Geophysical Co., will speak on the "Application of the Mass Spectrograph in the Petroleum Industry." H. G. Moulton, New York, consulting mining engineer, national president of the A.I.M.E., and Daniel C. Jackling, past national president, will also address the meeting.

Emby Kaye Named Chairman Expo Refiners Committee

Refinery exhibits at the 1940 International Petroleum Exposition will be the largest ever to be seen at any exposition, according to Emby Kaye, of the Distillate Engineering & Process Co. of Tulsa, who has been appointed chairman of the refiners committee for the May 18 to 25 Tulsa oil show. The committee, under Mr. Kaye, will assist in the preparation of special exhibits for the exposition's Hall of Science, in cooperation with the scientific and technical committee.

Chairman Kaye's committee includes: O. L. Cordell, Barnsdall Refining Co., Tulsa; Walter Miller, Continental Oil Co., Ponca City; E. R. Lederer, Bradford Oil Refining Co., Bradford, Pa.; Arthur E. Pew, Sun Oil Co., Philadelphia, Pa.; Lloyd S. Bayer, Tide Water Associated Oil Co., San Francisco, Calif.; H. W. Camp, Cities Service Oil Co., Tulsa; K. J. Smith, Skelly Oil Co., Eldorado, Kans.; Stewart Giraud, Humble Oil & Refining Co., Houston, Tex.

The displays of refinery equipment and developments will be enhanced by the selection of the "Grand Old Man" of the refining division. The old-timers committee for the Tulsa show will make this award, with the assistance of a refiners' nominating committee headed by John C. Day, secretary-manager, Western Petroleum Refiners Association.

A.S.M.E. Petroleum Division Program for Norman Meeting

A petroleum division meeting of the American Society of Mechanical Engineers will be held at the University of Oklahoma, Norman, April 12 and 13. The program follows:

Friday, April 12

8 to 10 a.m.—Registration. Lobby, Engineering Building.

10:10 to 10:25 a.m.—Address of Welcome, Dr. William Bennett Bizzell, president, University of Oklahoma.

10:25 to 11 a.m.—Address, Howard Coonley, chairman, Walworth Co., New York.

11:10 to 12 noon—"Distribution of Heat Energy, Its Measurement and Control," E. G. Bailey (founder of Bailey Meter Co.), now vice president, Babcock & Wilcox Co., New York.

Period I—1:10 to 2 p.m.—"Displacement Meters in the Refininery," W. H. McCoy, Gulf Refining Co., Pittsburgh, Pa.

Group B: "Thermodynamic Data on Hydrocarbons and Their Application," K. Lindley, Gulf Oil Corp., Tulsa.

Period II—2:10 to 3 p.m.—Group A: "Southern Industry and the Future," E. W. O'Brien, Editor, Southern Power and Industry, Atlanta, Ga.

Group B: "Measurement of Individual Well Production," W. O. Kitsman, Phillips Petroleum Co., Bartlesville, Okla.

Period III—3:10 to 4 p.m.—"The Application and Use of Reda and Kobe Pumps in the Oklahoma City Field," N. B. Chenault, Jr., British American Oil Producing Co., Oklahoma City, Okla.

Period IV—4:10 to 5 p.m.—"Maintenance of Gravity for Oil in Lease Storage," Max R. Wise, Bethlehem International Supply Co., ulsa.

Saturday, April 13

Period I—9:10 to 10 a.m.—Group A: "The Analytical Determination of Stresses in Cylindrical Pressure Vessels Due to Saddle Supports," M. D. Green, Black, Sivalls & Bryson, Inc., Oklahoma City, Okla.

Group B: "The Economical Selection of Compressor Equipment for Gas-Lift Operation," E. O. Bennett, Continental Oil Co., Ponca City, Okla., and G. M. Stearns, University of Oklahoma.

Period II—10:10 to 11 a.m.—Group A: "Operating Experience With the 850 psi—900° F. Extension at Market Street Generating Station," K. P. Kammer, efficiency engineer, New Orleans Public Service, Inc.

Group B: "Construction of the Utah Pipe Line," W. G. Heltzel, general superintendent, Stanolind Pipe Line Co., Tulsa.

Group C: "Visual Studies of Flow of Air-Water Mixtures in Vertical Pipe," R. L. Huntington, director, School of Chemical Engineering, University of Oklahoma.

Period III—11.10 to 12 noon.—Group A: "Preformance and Design of Shell-and-Tube Heat Exchangers," Byron Short, professor of mechanical engineering, University of Texas.

Group B: "Requirements of Equipment in Gas-Lift Operations," S. F. Shaw, consulting engineer, San Antonio, Tex.

Group C: "Motion Pictures Showing Pipe Line Construction on Utah Pipe Line, W. G. Heltzel.

Period IV—1:10 to 2 p.m.—Group A: "Compression Ignition Oil Engines in the Oil Industry," V. L. Meleev, research professor of mechanical engineering, Oklahoma A. & M. College.

Group B: "Development of Pipe Line Charts By Dimensional Analysis," L. H. Cherry, University of Oklahoma.

Period V—2:10 to 3 p.m.—Group A: "Weighing of Wells and Interpretation of Cards," F. C. Jones, Phillips Petroleum Co., Oklahoma City.

Group B: "Hydraulic Drives in Industrial Service," J. B. Jenkins, Twin Disc Clutch Co., Racine, Wis.

Period VI—3:10 to 4 p.m.—Group A: "The Application of Fluid Level Measurement," Charles Rodd, Gulf Oil Co., Case, Kans.

Group B: "Problems Encountered in the Maintenance of the Combustion System of Air-Injection Diesel Engine," E. R. Spencer, Texas-Empire Pipe Line Co., Tulsa.

Program for Conference On Fluid Metering

The first Petroleum Fluid Metering Conference was held at the University of Oklahoma, Norman, April 1938. Approximately 200 men from the industry attended and many expressed the opinion they had received a great deal of valuable information on the metering of viscous fluids which would be extremely beneficial to them in their work. A recent survey, made to determine how much progress had been made in the use of liquid meters in production, pipe line, and refinery practices, revealed increasing interest and it was decided to hold a second Petroleum Fluid Metering Conference at Norman on April 11 and 12.

All meetings will be held in the Engineering Auditorium. The program follows:

Thursday, April 11

8 to 10 a.m.—Registration. Lobby, Engineering Building.

10:10 to 11 a.m.—"Viscosity and Its Effect on the Accuracy of Positive Displacement Metering," J. W. Donnell, university staff.

11:10 to 12 noon—"Fundamental Principles of Volume Meters," E. E. Ambrosius, university staff.

12 to 1 p.m.—"Some Fundamental Considerations in the Design and Application of Displacement Meters," E. W. Jacobson, Gulf Research & Development Corp., Pittsburgh, Pa.

2:10 to 3 p.m.—"Crude Production Measurement," E. O. Bennett, Continental Oil Co., Ponca City, Okla.

3:10 to 4 p.m.—"Calibration of Meters in Pipe-Line Service," Henry Pohl and E. H. Counts, Sinclair Prairie Pipe Line Co., Independence, Kans.

4:10 to 5 p.m.—"The Use of Meters in Gasoline Pipe-Line Service." Roundtable discussion led by S. S. Smith, Shell Oil Co., Inc., St. Louis, Mo.

6:30 to 8 p.m.—"Report on Fluid Metering Research at the University of Oklahoma," E. E. Ambrosius, university staff, and H. S. Bean, Bureau of Standards, Washington, D. C.

"The Elimination of Air From Petroleum Pipe Lines." Roundtable discussion by H. G. Smith, Los Angeles, Calif.

Friday, April 12

9:10 to 10 a.m.—"Problems Encountered in Distillate Measurement," Earl Kightlinger, Arkansas-Louisiana Gas Co., Shreveport, La.

10:10 a.m. to 3:10 p.m.—Joint meeting with Petroleum Division A.S.M.E.

3:10 to 4 p.m.—"Progress in the Use of Meters in Crude Pipe-Line Service," T. R. Aude, Stanolind Pipe Line Co., Tulsa.

Magnetic Storm

TUCSON, Ariz., Mar. 21.—A moderate storm began March 19 at 10 a.m. and ended at 12 p.m., central standard time.

A very severe storm began March 22 at 12 p.m. and ended March 26 at 1 a.m., central standard time.

What about foreign employment?

This question in one form or another is asked The Oil and Gas Journal probably more than any other. It comes from a wide variety of sources ranging from fathers of sons graduating from college to middle-aged pipe liners who want to take a "crack" at a foreign job.

In this article, the writer who has visited several fields and refineries in South America, and in neighboring islands of Netherland West Indies, gives first-hand information regarding employment in areas which are representative of conditions outside the United States.

Lagunillas field, State of Zulia, Venezuela

Opportunities for Qualified Men in Fields Abroad

By C. O. WILLSON

THE first query of an American seeking foreign employment naturally is concerned with how to get a job. Regarding this there are many wrong impressions.

In general there is little chance of obtaining employment by going direct to the country in which the oil fields, pipe lines or refineries are located. Regulations have become so strict in many countries that it is practically impossible to enter if the immigration officials know the person is seeking employment. In several countries substantial deposits are required of visitors, with the exception of tourists, and restrictions limit the time that a visitor may remain. Employment in most cases is prohibited unless a permit from the government has been obtained, and this is usually a long-drawn-out procedure which may terminate unsuccessfully.

Back of this policy is the desire to protect domestic labor. Governments everywhere are endeavoring to widen employment, and so far as possible are inclined to restrict the hiring of foreigners to those actually required to carry on operations for which their own people are not trained.

Realizing this situation, most oil companies refuse to employ foreigners who contact them at points where their operations are under way. Thus, local employment is confined to the citizens of the country where the company is operating.

Most Americans and other foreigners now engaged in South American oil operations obtained their employment through the home offices of parent companies located in New York, London, The Hague, Toronto, or several other cities of North America and Europe. Most of the operating companies in South America are subsidiaries of the Standard Oil Co. of New Jersey and the Royal Dutch-Shell. American companies with smaller operations include subsidiaries of the Texas Corp., Socony-Vacuum Oil Co., Inc., Gulf Oil Corp., Standard Oil Co. of California, and Consolidated Oil Corp. (Sinclair). Letters to the New York addresses of these companies are referred to the foreign employment departments.

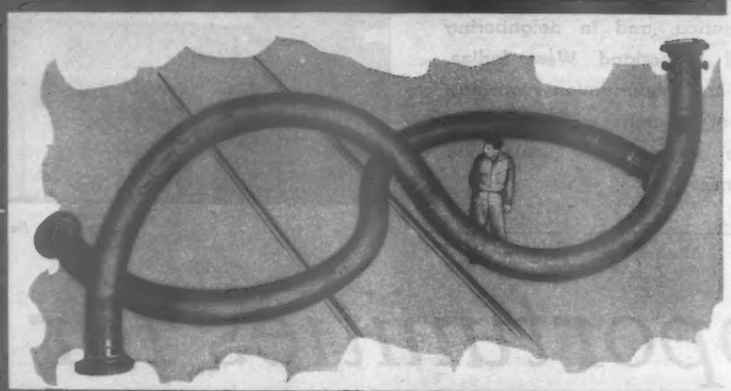
Colombia drilling crew with American tool pusher, Barco concession, Colombia

While the principal operating offices of the Royal Dutch-Shell are located in London, England, and The Hague, Netherlands, contacts in regard to employment can be made also through the principal American subsidiary, the Shell Oil Co., Inc., with offices in New York. The Asiatic Petroleum Co., another large Shell unit which has a great deal to do with South American operations, also has offices in New York. While a majority of the employes of the Shell subsidiaries in South America are English or Dutch, the companies employ a large number of Americans for work in fields and refineries.

The Standard of New Jersey operations in Peru and Colombia are in charge of the International Petroleum Co., Ltd., with headquarters in Toronto, Ontario, Canada. The Standard's operations are so widespread that it is in a position to fill its employment requirements from several sources. For example, a number of men employed by this company in its important South American operations were hired through its domestic subsidiaries, such as the Carter Oil Co., Tulsa, and the Humble Oil & Refining Co., Houston, Tex. In many cases experienced men who have been with these domestic companies for years and who have

Andian Hospital, Mamonal terminal, Andian National Corp., Ltd., Colombia

MIDWEST *Alloy* PIPING



14" O.D. Chromium-Molybdenum pipe bends with Van Stone laps. Entire bends annealed after fabrication.

Carbon-Molybdenum header stress relieved in furnace before welding on valves which were welded by preheating and stress relieving with induction method.

PRESSURE piping users have found that alloy tubing presents many problems and difficulties not encountered when low carbon steel materials are used. Some have learned by bitter experience that the utmost care must be exercised in selecting a fabricator . . . one who has wide experience in the special manufacturing procedures required by the various alloys. It is also essential that the fabricator's welders be skilled on welding alloy tubing . . . and that he have the heat treating furnaces and other special equipment needed.

Each of the three Midwest plants is thoroughly familiar with all the "do's" and "don'ts" peculiar to the fabrication of alloy tubing. Midwest has welders qualified on the alloys . . . and Midwest has the special equipment so essential to the successful fabrication of alloy tubing.

Whenever you need alloy piping, you will find it definitely advantageous to get in touch with the nearest Midwest office.

MIDWEST PIPING & SUPPLY COMPANY, INC.

Main Office: 1450 S. Second Street, St. Louis, Mo.

Plants: St. Louis, Passaic (N. J.) and Los Angeles · *Sales Offices:* Chicago—946 Marquette Building · Houston—1716 Second National Bank Building · Los Angeles—520 Anderson Street · New York—(Eastern Division) 30 Church Street · Tulsa—533 Mayo Building.

expressed a desire to enter foreign service, are given jobs as they become available. It is the general policy of all American companies to select men already employed by them so far as it is possible to do so without crippling their domestic operations.

In most cases, however, additional employes are required and this affords an opportunity for new men to obtain employment in foreign service. These men may be selected from the application files. If a large number of men are required within a few days or weeks applications may be solicited and a selection made from those whose services are immediately available. Most companies have far more applications on file than they have jobs. At the same time there is often a scarcity for certain types of employment and in filling these jobs requests for men may be sent the employment departments of subsidiary and affiliated companies. The larger companies have personnel staffs especially trained to select men for foreign service.

Scope of Employment

All matters relating to passports, visas, deposits and other entry requirements are usually taken care of through the employment departments before the new employe leaves for his work.

The scope of employment in foreign service covers practically everything with the exception of common labor, for which local residents are usually employed. Possibly the greatest demand is for the skilled labor. This includes drillers, welders, machinists, carpenters, bricklayers, and practically all the other skilled trades as well as geologists and petroleum engineers. Oil operations in foreign countries cover a wide range of activities in addition to those commonly associated with developments in this country, and this is reflected in the qualifications required of the men employed. In the fields visited by the writer any labor scarcity appeared to be confined to men of special training. For example, two companies needed more men trained in warehouse work. Large stocks of equipment and supplies are maintained at all times and this fact stresses the need of qualified warehouse men.

In regard to the trades it should be mentioned here that the number of skilled craftsmen required in the oil operations of several foreign countries will probably decrease in the future. Residents of these countries are being trained by the oil company managements with satisfactory results so that in some fields only American supervision is required.

Work in the fields, plants and offices requires the same general qualifications as in this country. Advancement usually comes more rapidly than in this country.

In hiring new men, age limits are observed and a thorough health examination must be passed by applicants. It happens that most of the oil outside this country is produced and refined in tropical areas, and a healthy body is required to withstand the climatic conditions and make the necessary adjustments in manner of living. Climatic conditions even in the low tropical areas are not as unfavorable as many have been led to believe. Temperatures usually do not go as high by 10 to 20 degrees, as they do in Texas and Oklahoma. Humidity is greater. Favorable trade winds or higher altitudes assure delightful climates at several oil operating centers.

In general, wage and salary scales for Americans employed in foreign oil operations are higher than in this country. For some types of work there is a substantial advantage in favor of the foreign work. In addition there are savings due to the customary policy of furnishing homes for married employes and lodging and food for bachelors. The policies vary with different companies and even within one company according to living conditions in the operating centers. In some instances a nominal charge is made for these facilities and in other cases they are furnished free. They include water, lights, and fuel. Medical attention and hospitalization are furnished employes and their families at little or no cost. These advantages in compensation and living expenses enable many employes to save a substantial part of their income. The usual practice in South America is to draw sufficient money to cover local expenses and the remainder is deposited to the account of the employe in a bank located in the country of which the employe is a citizen.

Vacations

Length of employment and vacation arrangements are of special importance in foreign work. Here again the policies of companies vary somewhat, although an advantage in one plan is generally offset by less favorable features when compared with another type. Formerly the period of duty covered three years. Now a two-year arrangement is in effect in several fields and refineries.

Under this arrangement the employe's traveling expenses are paid from his home to the point of his employment. The new employe may be transported in company-owned tankers or passenger ships from New York to the South American headquarters of the company. At the end of the first year he is entitled to a two weeks' vacation with pay. This is now known as a local leave. This does not provide sufficient time to return to the United States except by plane, and the vacation generally is spent near the point of employment. Persons employed in Venezuela often go to Trinidad or islands of the Netherland West Indies.

At the end of the second year a man is entitled to a 42-day vacation plus the time required to go to the United States and back by boat. This in effect means a vacation period of about two months. Transportation expenses are paid by the employer. If the employe renews his employment he returns to headquarters at the end of that period and continues his work.

Working Conditions

It is possible to make only a few general observations relative to working conditions. Obviously these will vary widely, depending on location of operation, climate and other factors over which the operating companies have no control. It is the policy of all managements so far as possible to establish living and working conditions on a parity with those in this country.

Where operations are isolated, large sums are spent not only in establishing comfortable living quarters but also amusement facilities. Tennis courts, golf courses, club houses, swimming pools, are provided, as well as outdoor and indoor sports. These of course are found only where an operation has been under way for some time.

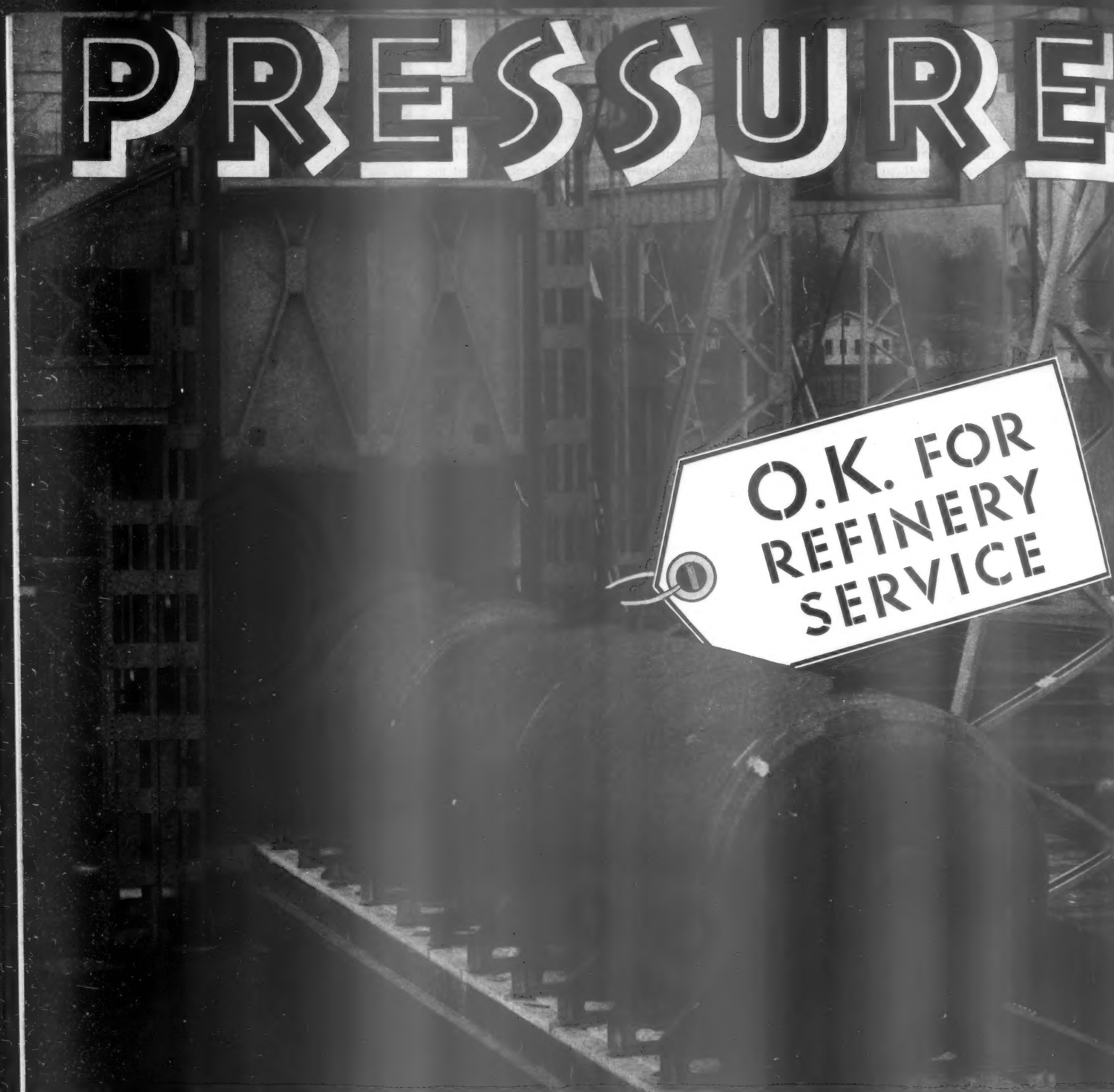
Geological crews who work in remote sections of foreign countries and drillers of wildcat wells are confronted with entirely different conditions. These vanguards of foreign oil operations have many problems not found in the established camps and no attempt will be made to discuss them in this article.

These operators must have a love of adventure

(Continued on Page 192)

Top: Part of Camarebo camp, Standard of Venezuela. Second from top: Club house for Standard of Venezuela employes, Carapito camp, eastern Venezuela. Center: General offices, Lago Petroleum Co., Maracaibo, Venezuela. Second from bottom: New quarters for Venezuelan employes, Colon Development Co., Ltd., at Tarra, Venezuela. Bottom: Mamonal, Colombia, loading station, Andian National Corporation, Ltd.

PRESSURE



HERE is a typical welded steel pressure vessel just leaving the stress relieving furnace at our Birmingham plant. It will soon be on its way to a modern refinery, where it will be used in a specific refining process. In mere words, the complete operation seems quite simple. Actually, behind the picture lies a panorama of specialized experience gained in years of handling this type of work—the combined skill of expert workmen—and constant inspection during each step of fabrication. For example, all welding is done by experienced welders who have successfully passed rigid qualification tests of our own in addition to A.P.I. requirements. This strict policy of qualification and inspection assures you of uniformly high grade workmanship. All three of our fabricating plants are fully equipped to handle both field erected and shop-assembled work including all types of welded pressure vessels built in accordance with the A.P.I.-A.S.M.E. specifications. The Birmingham plant has, in addition, complete facilities for X-raying and stress relieving such vessels. Please address our nearest office for information or quotations on any type of work you may be contemplating at the present time.

CHICAGO BRIDGE & IRON COMPANY

Fabricating Plants in BIRMINGHAM, CHICAGO and GREENVILLE, PA.

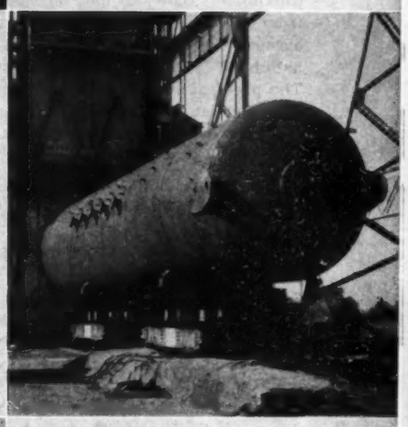
VESSELS

BUBBLE TOWERS

PROPANE TANKS

PRESSURE STILLS

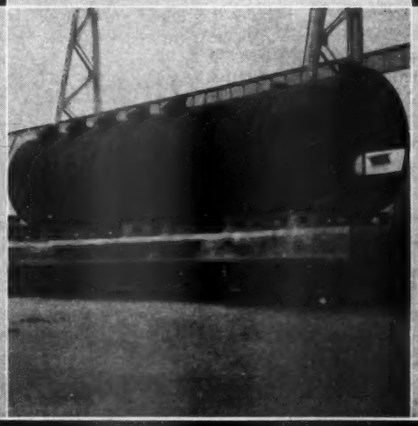
FRACTIONATING COLUMNS



ABSORBER TOWERS

FLASH TOWERS

POLYMER TOWERS



ACCUMULATORS
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EVAPORATORS
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BUTANE TANKS
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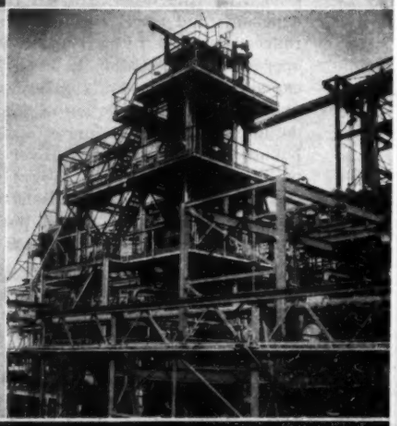
PRESSURE OR VACUUM VESSELS FOR ALL PURPOSES



DALLAS 1441 Liberty Bank Building
HOUSTON 2919 Main Street
TULSA 1606 Hunt Building
BIRMINGHAM 1536 N. Fiftieth Street

CHICAGO 2128 McCormick Building
DETROIT 1514 Lafayette Building
CLEVELAND 2204 Rockefeller Building
NEW YORK 3347-165 Broadway Building

PHILADELPHIA 1615-1700 Walnut St. Building
BOSTON 1517 Consolidated Gas Building
SAN FRANCISCO 1054 Rialto Building
LOS ANGELES 1423 Wm. Fox Building

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International

Russia . .

Sakhalin Production Increasing Annually

SOVIET RUSSIA plans to produce 8,800,000 bbl. of oil in 1942 from the northern part of Sakhalin where output in 1939 has been estimated at approximately 3,300,000 bbl. The Soviet production from Sakhalin has increased annually, with the exception of 1937, since 1927 when the trust "Sakhalinneft" was created for operating purposes. The production in 1938 was reported at 2,436,000 bbl. after output slumped to 1,661,000 bbl. in 1937 from a previous peak of 2,079,000 bbl. in 1936.

The Japanese company, North Sakhalin Petroleum Corp., plans production of 3,000,000 bbl. this year and expects to lift output to 3,100,000 bbl. in 1941.

The total reserves in northern Sakhalin are estimated by Soviet engineers at approximately 2,160,000,000 bbl. Developed, prospected and visible reserves of the territory under Soviet domination are calculated at 135,000,000 bbl. American engineers who have had opportunity to observe conditions existing on Sakhalin Island consider both figures on reserves on the liberal side.

The modern development of Sakhalin's petroleum reserves dates from 1920 when Japan occupied the northern part of the island with a military force after discovering that a bulk of the mineral wealth appeared confined to that section which was awarded to Russia in 1905. Five years after the 1920 military occupation, Japanese forces withdrew but obtained a contract for petroleum development in consideration of the capital invested for drilling and geological investigation in the demilitarized zone. Until 1933 the Japanese company held the lead in production activity, but since that time Soviet output has been gradually drawing ahead.

The U.S.S.R. production in northern Sakhalin is a source for part of its requirements in the far eastern sections of that country, because deliveries from the other Russian fields involve an expensive and mechanically weak long overland railroad haul. A refinery at Khabarovsk started operating on Sakhalin crude oil in 1936 and an expansion of processing facilities there is now under way but completion of the program is indefinite. Two other refineries at Komsomolsk and Nikolayevsk on the Amur River were originally on the Soviet petroleum program for 1940, but the recent ban on technical assistance from American engineers and effects of the war with Finland may postpone these projects.

Receipts of gasoline from the United States at far eastern Russian ports jumped to a new high in 1938 and have continued so far this year at an even higher level. It was the movement of United States petroleum products to the far eastern water terminals of Soviet Russia that precipitated the original feeling between Sweden and Washington during the early days of the Finnish invasion.

The two most important fields developed by the Soviet on Sakhalin are at Ekhabi and at Okha. The island is 585 miles long and 156 miles wide at the extreme points. Since Sakhalin petroleum would be extremely valuable in meeting Japanese military requirements repeated purchase offers have been made without success to the Moscow government.

New Guinea . .

Drilling Proceeding On Two Deep Tests

DRILLING is proceeding at 4,600 and 4,950 ft. on the two deep tests in New Guinea, according to information from the United States trade commissioner at Batavia, Java. The exploration work is being carried out by N. V. Nederlandsch, Nieuw Guinea Petroleum Mij., an organization created by the Royal Dutch-Shell, Standard-Vacuum Oil Co., Inc., and Standard Oil Co. of California.

Two shallow wells are currently producing low-gravity oil from about 200 ft. A showing of gas and several small showings of oil have been encountered in the two deep tests in the south Vogelkop in Northwest New Guinea but none so far has given commercial promise.

Exploration on the New Guinea concession covering about 27,500,000 acres has been under way for about 4 years. Geological and geophysical investigations are being made in other parts of the concession, however, with the object of determining further suitable locations. These activities, and, more especially, the transportation of heavy equipment far into the interior over difficult terrain, have naturally incurred considerable expense. It is estimated that almost $10,000,000 has been expended so far in the exploratory work. This sum includes the purchase of amphibians, drilling equipment, the construction of dwellings, hospitals and storehouses, and the salaries and wages of about 3,000 to 4,000 employes, including approximately 100 Europeans.

One condition of the contract made by the company with the Government of the Netherland Indies on January 1, 1936, is that an area of 21,069,000 acres of the total concession area must be returned to the government within a period of 10 years, i.e. not later than January 1, 1946. Yet another stipulation in the contract is that within a certain time after the return of the 21,069,000 acres to the government, deep drilling operations must be carried out on each plot or block retained for exploitation, a frequency of three operating drilling installations being stipulated.

Portugal . .

New Lisbon Refinery Is Placed on Stream

THE Sociedade Anonima Concessionaria da Refinacao de Petroleos em Portugal (SACOR) has placed on stream its new 3,500-bbl. refinery at Lisbon, Portugal. The company was created by Portuguese, French, and Rumanian interests and obtained a long-term government concession to supply up to 50 per cent of the domestic demand for petroleum products

The refinery consists of a two-stage distillation unit for production of straightrun gasoline, the conventional side streams of naphtha, kerosene, gas oil, and residual fuel or asphalt. The vacuum stage is designed along flexible lines to handle 1,200 bbl. of pressure distillate daily, or it can be operated at atmospheric pressure to increase production of the light products if conditions warrant.

The lubricating-oil finishing plant is equipped with sulfuric acid solvent system operating through batch agitators and settling trays.

The plant was designed by Moore & George, Ltd., and was constructed under that firm's engineering supervision. General supervision was exercised by Prof. Herculano de Carvalho, president of the Institute Portugues de Combustiveis (Bureau of Mines), assisted by Eng. Henrique Peysonneau, director of the same department.

Japan . .

Possible Designs In East Indies

CONCERN has been aroused over the future of the Netherland East Indies petroleum industry by Japan's abrogation of the trade treaty with the Netherlands. Explanation was made in Tokyo that it was simply a formal step leading to renewal of the old agreement which would have expired of its own terms next August. Nearness of the Netherland East Indies to Japan has long constituted a potential threat to this far eastern oil reserve.

Since the United States discontinued its trade agreement with Japan, the question of petroleum supplies for Nippon has become more acute. Japan has continued to purchase on a reduced scale in the United States and has made efforts to establish a supply source in Mexico, which is difficult because of the present inability to make delivery on the Pacific Coast.

The potential threat exists that Japan may take advantage of the European war to make its move against the Netherland East Indies which produced about 66,800,000 bbl. in 1939. Japan currently receives about 19,000,000 bbl. annually from the Netherland East Indies. When the trade agreement was effective with the United States Japan purchased approximately 30,000,000 bbl. in this country.

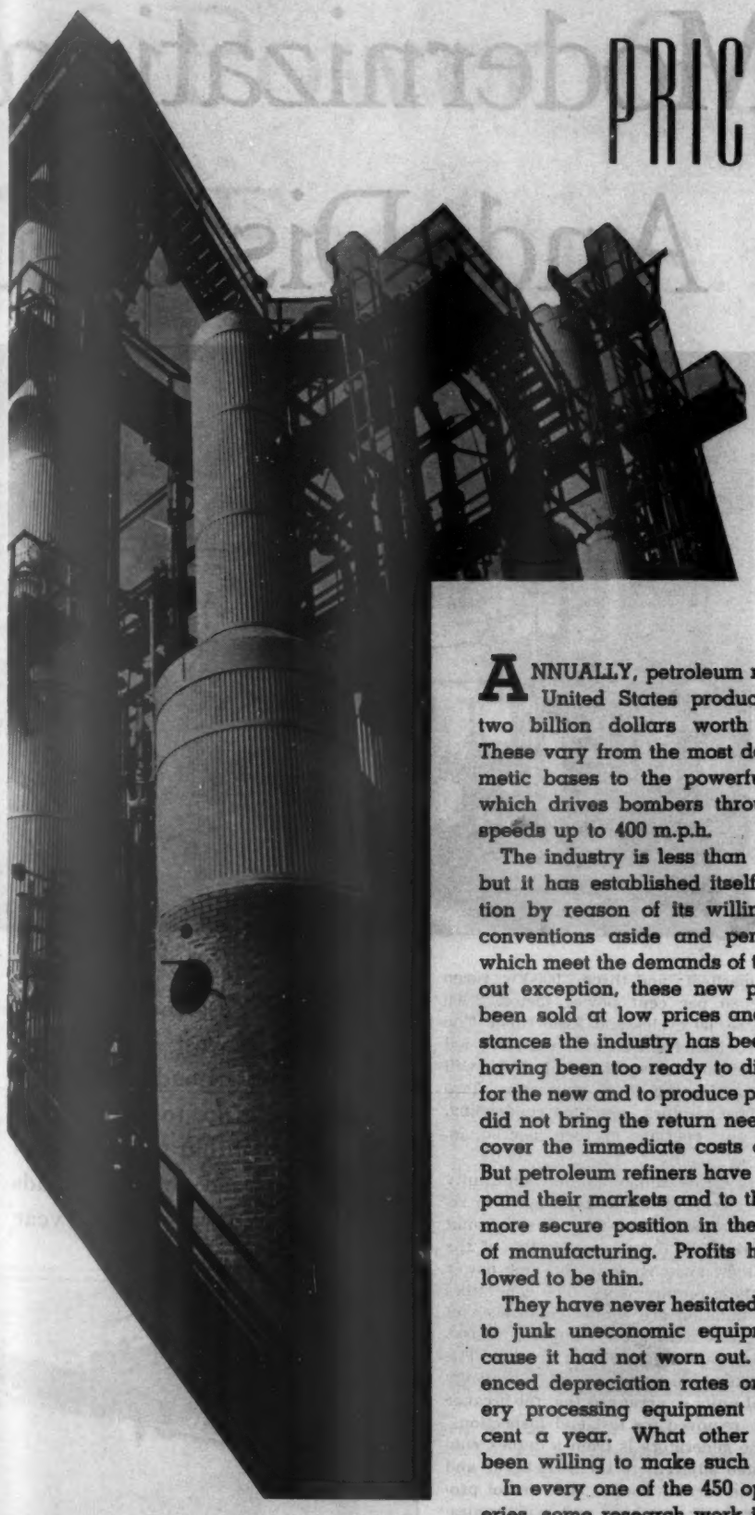
Brazil . .

Makes Contract for Geophysical Survey

THE Brazilian Government last week announced consummation of a contract with United Geophysical Co. of Los Angeles, Calif., covering an extensive investigation of that country's petroliferous territories. No other details were available, but it is considered likely that the work will involve an elaboration of the soil-analysis method using the mass spectrometer, development of which was described at the annual meeting of the American Institute of Mining and Metallurgical Engineers in New York by Herbert Hoover, Jr.

Reports from Rio De Janeiro stated that the government recently provided $750,000 for the petroleum survey, which was thought in New York to cover some of the drilling operations which are now in progress on the eastern coast of Brazil.

PRICE OF PROGRESS



Boldly undertaking costly research programs and holding down the price of the new products to attract new markets, has been the successful policy of the refining industry

BY
W. T. ZIEGENHAIN

ANNUALLY, petroleum refiners in the United States produce more than two billion dollars worth of products. These vary from the most delicate of cosmetic bases to the powerful motor fuel which drives bombers through space at speeds up to 400 m.p.h.

The industry is less than 100 years old but it has established itself in this position by reason of its willingness to lay conventions aside and perfect products which meet the demands of the day. Without exception, these new products have been sold at low prices and in some instances the industry has been accused of having been too ready to discard the old for the new and to produce products which did not bring the return needed to amply cover the immediate costs of production. But petroleum refiners have worked to expand their markets and to thereby gain a more secure position in the future world of manufacturing. Profits have been allowed to be thin.

They have never hesitated, for example, to junk uneconomic equipment just because it had not worn out. They experienced depreciation rates on major refinery processing equipment up to 20 per cent a year. What other industry has been willing to make such changes?

In every one of the 450 operating refineries, some research work is undertaken. In the larger units the programs often call for the employment of hundreds of men and the expenditure of many thousands of dollars annually.

Sometimes a substantial share of this work is done by engineering companies who work in close relationship with the research staffs of the refineries and the net result has been the speedy but orderly development of important new processes.

Recognition of this fact has lead to the belief that only a limited number of refiners will be justified to install the most complex processes. The greater number of refiners will be unable to compete for some of the more technical markets.

The security of refiners, however, is more a function of their location with respect to markets than a matter of threatening technical progress.

But in any event, these economic changes are ever working and they assert themselves gradually so in viewing the future the refiner is able to assume an unusually optimistic view.

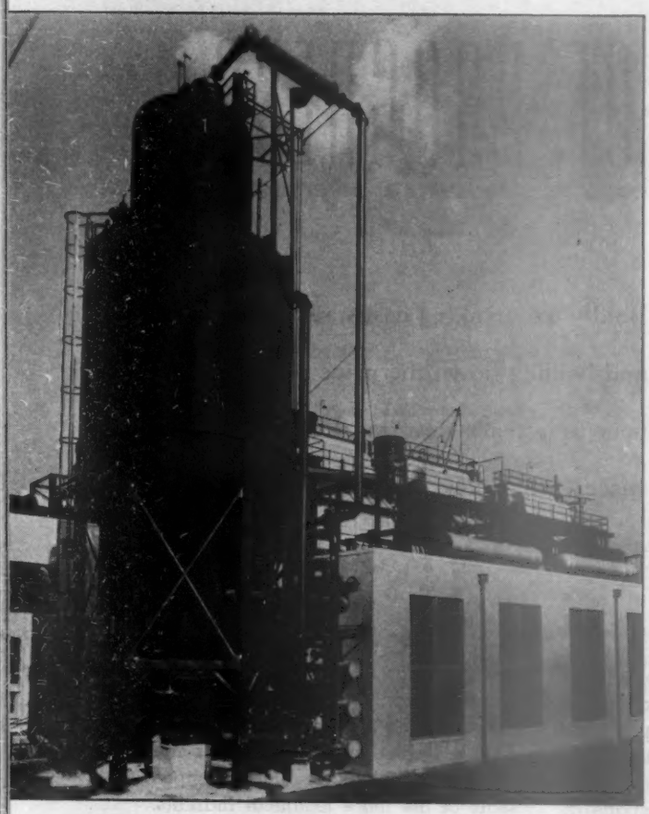
Last year brought new peaks in practically every phase of refinery operations in the United States and many foreign countries. The year's increase in crude runs to stills was one of the largest in the history of the industry.

The first quarter is now closing on another year which is certain to see more records established. The latest available reports reveal the demand for most products far exceeds the estimates made as the old year closed.

The domestic gasoline demand in January showed an increase of 7 per cent over the first month of the previous year. Refiners in this country will be called upon to furnish around 640,000,000 bbl. of motor fuel this year—a gain of approximately 45 per cent over 1929. The winter consumption of gasolines is now as great as the summer demand 6 years ago.

In recent years the percentage increase in demand for several products has exceeded that of gasoline. More kerosene, gas oil and distillate were consumed last year than any previous year and the gain in the domestic shipments of these products the first 31 days of this year was nearly one-third greater than a year ago.

Modernization And Distribu



Rear view of the firing aisle, water-treating plant and deaerating heater, and hot-water storage plant at Port Arthur plant

View of the firing aisle, showing front of boilers

This article describes one of the industry's newest and largest power plants. Loads have been encountered up to 19,000 kw. It is expected that the plant will handle average monthly loads of 17,500 kw. during current year

DURING 1939, the Texas Co. has had under construction a new modern power plant at its Port Arthur refinery, in order to meet the ever-increasing demands for additional steam and electrical power necessitated by increased activities.

The steam-generating facilities of this plant consist of three 300,000 lb. per hour, 675-lb. design pressure, three-drum type steam-generating units which will normally operate at a pressure of 615 lb. gage and 715° total steam temperature. The steam-generating facilities are complete with provisions for air preheating, water treating, motor-driven forced and induced fans, both steam and motor-driven boiler-feed pumps, and other necessary auxiliaries.

The electrical-power-generating facilities, with which this article deals, consist of three 7,500-kw., 80 per cent power factor, 2,400-volt 60-cycle three-phase 3,600-r.p.m. generators with direct-connected main and pilot exciters. A spare steam-driven exciter is provided to furnish excitation to either of the three main generators in the event of the failure of a direct-connected exciter. Two of the units are driven by back-pressure turbines which operate between 585 lb. gage and 150 lb. gage, which steam at the latter pressure is used for general refinery use. The third unit is driven by a mixed-pressure turbine operating at 585-lb. per sq. in. throttle pressure, 150 lb. extraction, 15 lb. induction and condensing at 27 in. of vacuum. This unit is used to provide a steam balance between the various pressures of steam required for refinery use.

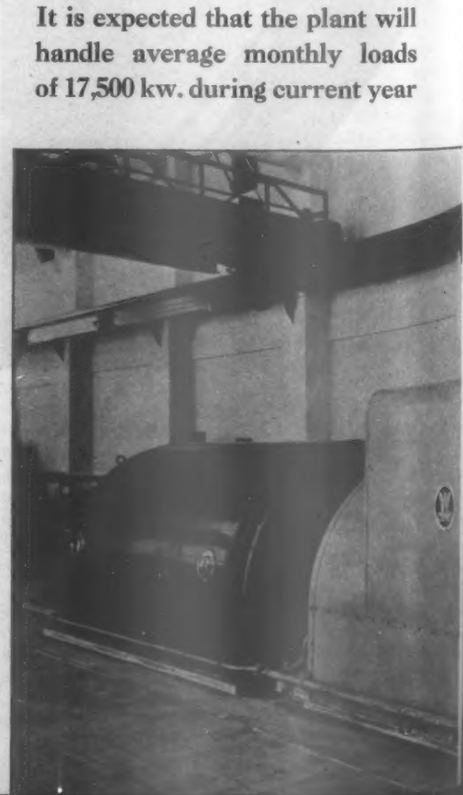
Old Power House

The old power station was put in operation in 1923 and has a rated capacity of 7,440 boiler hp. installed in 10 units operating at 215 lb. per sq. in. and 200° F. superheat; and three 3,000-kw. turbo generators for 80 per cent power factor, 2,400 volts, three-phase, 60 cycles and 3,600 r.p.m. The excitation is provided from an excitation bus fed by two steam-driven exciters either of which will supply excitation for the three generators. Two of these turbogenerators operate condensing, and the third unit operates at 15-lb. per sq. in. back pressure.

Due to the fact that reliability and continuity of electrical service is of major importance in refinery operations, more than the usual amount of study was given to the proper design of the main and auxiliary switchgear in the new power plant to meet these requirements. The generators in the new installation are connected to each of two insulated buses with a 3,000-ampere, 350,000-kva. interrupting capacity oil-circuit breaker. The oil-circuit breakers and buses are completely housed in metal units so arranged that the breaker element can be removed for test and inspection.

Control of the generators is from a duplex control board located adjacent to the switchgear and at the end of the turbine room. The control provides automatic-speed matching and synchronization of generators to either of the main buses. All control and metering equipment required for operation are on the front of the duplex control board, and the relays, watt-hour meters, etc., are located on the swinging rear panel.

The station-service equipment is connected to the main bus by two circuits with 1,200-amp., 250,000-kva. interrupting-capacity breakers. In order to keep the interrupting capacity of the auxiliary breakers to a minimum, reactors were installed between the breaker on the main bus and the bus for the station switchgear. The arrangement of the auxiliary gear is similar in con-



# of Power Generation

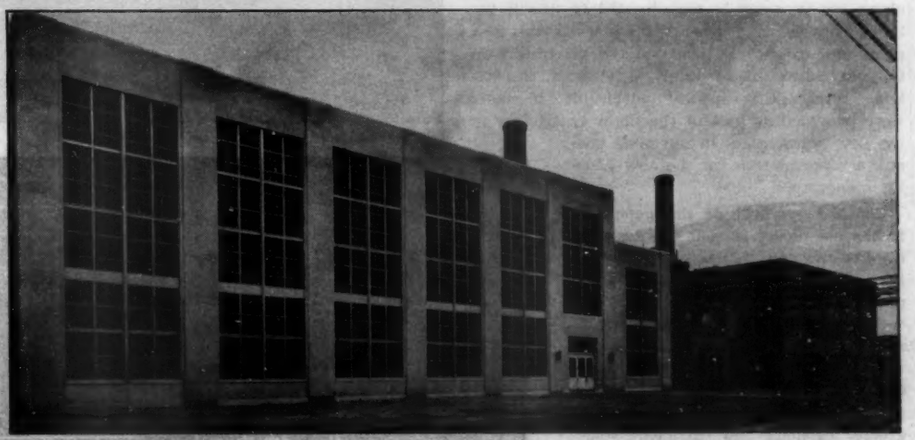
tion Facilities... at Texas Co. Plant

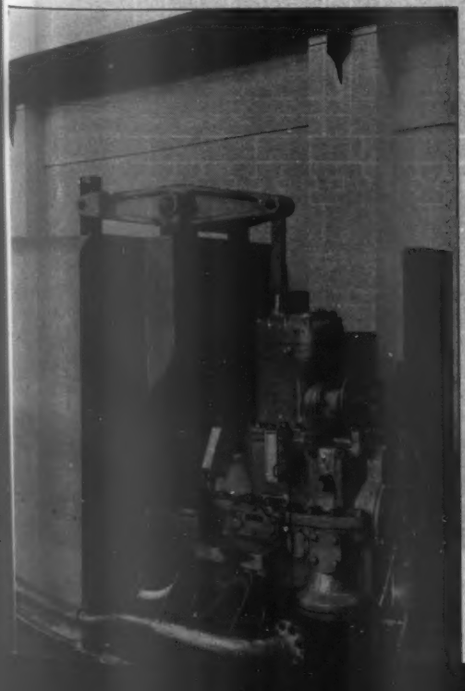
By L. E. PRIESTER
Electrical Engineer, The Texas Co.

and HENRY FLYNN
Power Engineer, The Texas Co.

struction to the main metal-clad gear and all essential equipment that is not relayed by steam can be connected to either or both of the auxiliary buses by a back-to-back arrangement of breakers.

A tie breaker is connected between the buses for the auxiliary switchgear equipment so that the load can be divided between the main buses, or all the load carried on one bus. Under normal conditions, however, the station-service load will be equally divided between buses so that in the event of the failure of one of the station feeders the load can be switched to the other feeder with a minimum outage. The auxiliary gear provides





Top of page: View of firing aisle, showing boiler-feed pumps. Above: Front view of new and old generator plants. Left: No. 1 turbogenerator from turbine end

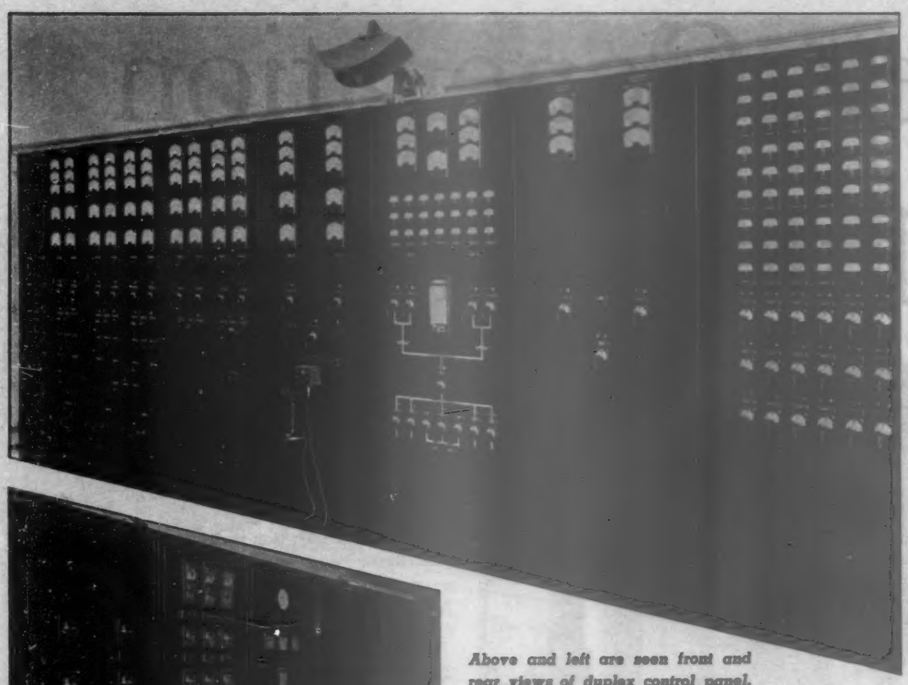
starting equipment for six fan motors, two boiler-feed-pump motors, two booster-pump motors, and two sets of station-service transformers for 220-volt auxiliaries.

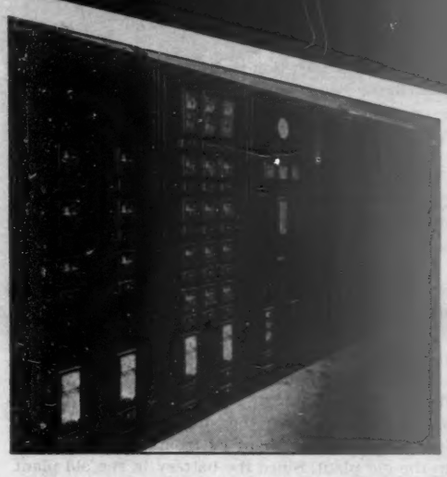
In a separate room adjacent to the auxiliary switchgear there are two banks of three 50-kva. transformers for 220-volt power supply for miscellaneous auxiliary drives, together with two 50-kva. transformers for lights, each of which is suitable for carrying all of the plant-lighting load. The same general arrangement, with duplicate circuits, is provided to insure continuity of service for both lighting and 220-volt power. The main 220-volt lighting and power distribution panel is located in the partition wall between the auxiliary switchgear room and the transformer room, and from that point circuits are run to branch panels located conveniently from the standpoint of distribution.

The storage-battery room is located adjacent to the transformer room. There are sixty 200-amp. per hour batteries suitable for 125 volts. This battery set is used for direct current control for all circuit breakers in the old and new plants, as well as for the breakers on the 33-kv. distribution system. The battery-charging set is located in the main switchgear room so that it will be under the close supervision of the power-plant operators.

Emergency lighting panel is provided with a double-throw contactor so that d.c. power may be supplied either from the storage battery located in the new power plant or from the one located in the old plant. Since the battery in the old plant has been in service several years, it was thought advisable to provide a new battery for control of all breakers and utilize the old battery for emergency lighting under normal conditions. However, the old battery has sufficient capacity to take care of the solenoid-operated breakers in the event of an emergency.

The switchgear in the old plant is located in a concrete cell structure which houses three generator breakers and 11 distribution-feeder breakers. As these oil-circuit breakers were installed when the old plant was built, they had a lower interrupting capacity than would be required with increased generator capacity added to the system, and it was necessary to replace these breakers with breakers having a greater interrupting capacity. The old cell structure could not be rebuilt economically to house the larger generator oil-





Above and left are seen front and rear views of duplex control panel. Below is seen the No. 1 turbo generator from the exciter end

circuit breakers and as the new station is only about 100 ft. away it was decided to install the higher interrupting-capacity breakers in the new plant and extend the leads to the generators in the old station. Accordingly, 1,200-amp., 250,000-kva. interrupting-capacity oil-circuit breakers were provided as part of the main switchgear in the new power plant in the same general arrangement as for the new 7,500-kw. generators.

Complete control of the generator in the old power station was brought over to the new duplex control board in the new station in order that the power-plant operator might have centralized control of all generating equipment in both the new and old plants.

The bus in the old plant was originally a ring bus and was converted to a parallel bus. In order to obtain greater capacity and sufficient structural strength, the flat bus was replaced by an angle bus supported on new insulators.

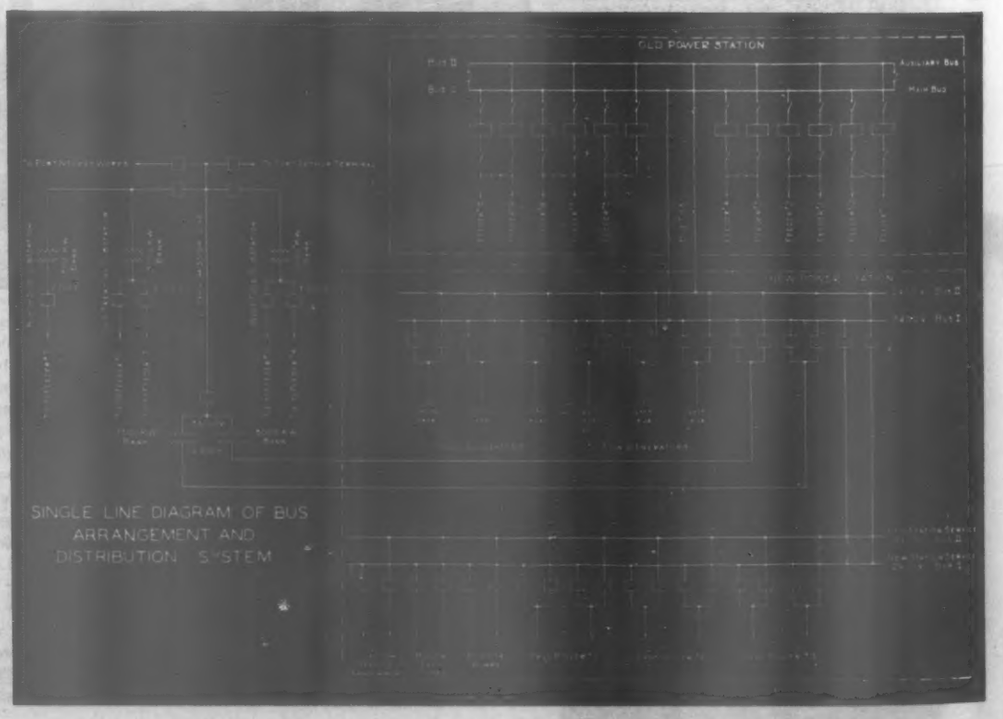
Since it was necessary to make provision in the new power plant for new breakers for the old generators, these old breakers by some rearrangement were utilized for distribution feeders so that it was possible to relay each of the 11 feeders either by a tie connection through outlying substations or by double breakers for each circuit, or an equivalent means.

The control of all of these feeders is under the supervision of the power-plant operator, as the control circuits were brought over to the duplex control board in the new plant. Remote-operated switches were provided for each of these circuits together with three-phase ammeters for load indications so that the plant operator will have complete control of all generators as well as the 2,400-volt distribution system. The overload relays and watt-hour meters for these feeders will remain on the present control panel in the old station.

The buses in the new plant are connected to the distribution bus in the old plant by means of two 3,000-amp. insulated bus ties complete with air-break disconnect switches of such capacity that in the event of an emergency either bus could carry the entire load on the 2,400-volt distribution system.

Step-Up Transformers

In addition to the 2,400-volt distribution system there are two feeders from the new bus, feeding step-up transformers located adjacent to the new power plant. The oil-circuit breakers controlling these two circuits are 2,000-amp. rating with 250,000-kva. interrupting capacity arranged with double breakers the same as provided for the generator breakers described above. One of the banks of transformers is of 5,000-kva. capacity and the other a 7,500-kva. bank with 2,400-volt secondaries and 33,000 volts on the high side. A 33-kv. oil-circuit breaker, 600-amp., 250,000-kva. interrupting-capacity, controls a common feeder to a switching arbor located at an approximate distance of 1,000 ft. from the transformer bank. From this arbor



Above: At left is seen the station-service transformers—220-volt, three-phase power and 220/110-volt lights; at center is seen the main metal-clad switchgear, and at right the laboratory at the water-treating plant

four 33-kv. high-line feeders furnish power to three outlying substations within the refinery and two nearby plants of the company. The breakers for these feeders were equipped with DeIon grids to increase the interrupting capacity to 155,000 kva., which was necessitated on account of increased generator capacity.

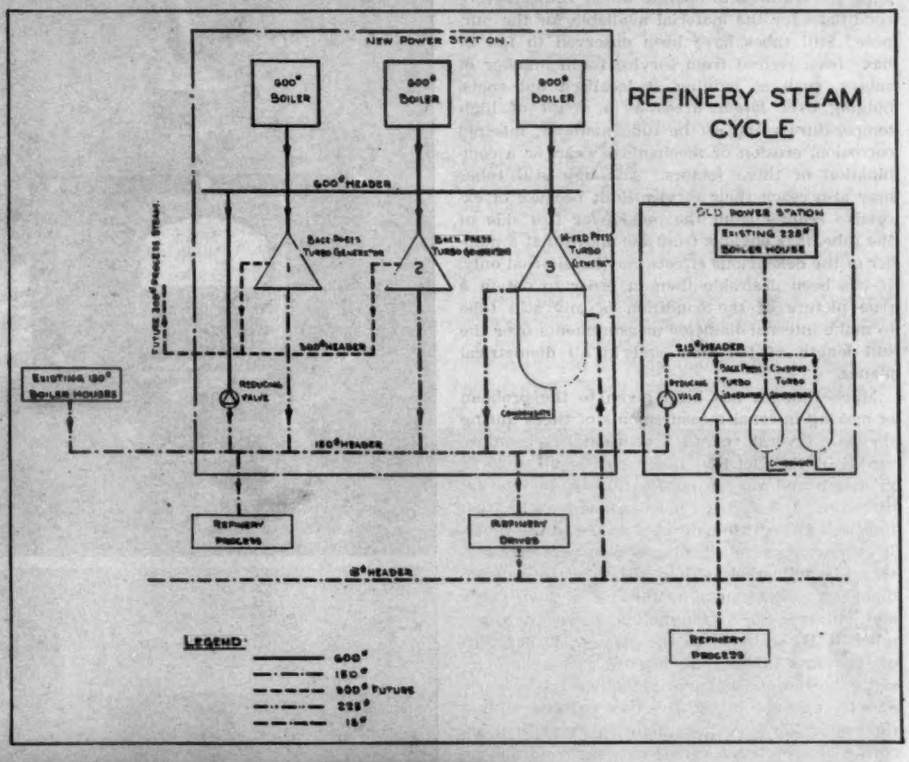
Location of Control

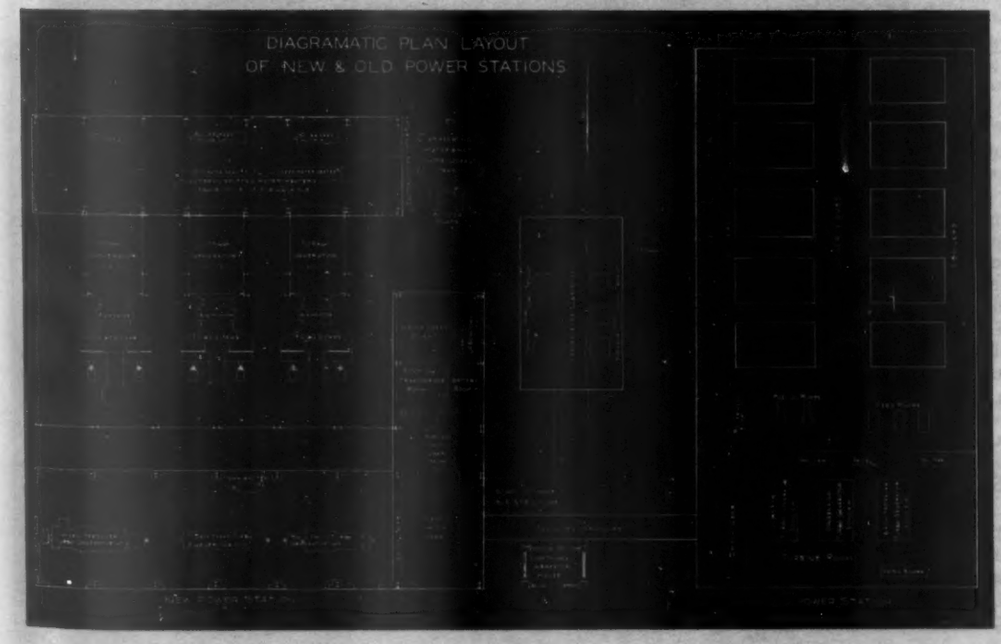
The control of all the 33-kv. breakers is located on the duplex control panel, thus centralizing the control of all distribution feeders.

With the new power plant in operation the total electrical generating capacity of the two plants is shown in the following tabulation:

	No. units	Cap. per unit		Total capacity	
		Kw.	Kva.	Kw.	Kva.
Old power station	3	3,000	3,750	9,000	11,250
New power station	3	7,500	9,375	22,500	28,125
Total	6	....	....	31,500	39,375
Available capacity with largest unit out of service		....	....	24,000	30,000

Up to the present time peak loads have been encountered up to 19,000 kw. and the largest monthly load to date has been 15,500 kw. It is expected that within the present year both of the above figures will be increased by at least 2,000 kw. due to summer peak loads and increased activities.





Capacity of Plant

Under normal operating conditions the three turbogenerators in the new plant will take care of the electrical-power requirements and the three generators in the old plant will be for standby service. In the event one of the 7,500-kw. units is down for repairs, the two condensing turbines in the old plant will be operated. The 15-lb. back-pressure turbine will be operated only in extreme emergencies, since there is now a surplus of exhaust steam, and when operating this unit, in all probability the steam would be exhausted to the atmosphere.

The new power plant was completed the latter part of 1939. Practically all the work has been finished with the exception of the control wiring between stations and certain changes to the 2,400-volt distribution system.

Measuring Internal Diameter of Still Tubes

By W. A. HOWARD
Socony-Vacuum Oil Co., Inc.

THE safe and economical operation of tubular stills in oil-refinery service is dependent upon frequent and thorough inspection of the component parts. Subjected as they are to liquids and vapors under high pressure on one side and radiant fire on the other, many tubes in these stills are required to operate under rather severe conditions for the material available for the purpose. Still tubes have been observed to fail or have been retired from service for a number of causes, such as bulging at localized hot spots, bulging over larger areas as a result of high temperature creep of the tube material, internal corrosion, erosion or mechanical wear, or a combination of these factors. Although still tubes may also reach their service limit because of excessive scaling from the outside or fire side of the tube, it is obvious from the above that a number of the deleterious effects may be internal only. It has been desirable then in order to obtain a true picture of the condition of any still tube to make internal-diameter measurements over the full length of the tube and in all diametrical planes.

Much thought has been given to the problem of making internal measurements of tubes during the past several years. A solution has been retarded by the fact that tubes may be up to 40 ft. in length and vary from 2½ to 5 in. in internal diameter. Also furnace installations may be such that it is difficult to gain easy access to the tubes. Inspectors have relied for the most part upon external examination, either visual or by outside diameter measurement by the use of snap gages and calipers. Such examination, however, leaves much to be desired. On the average 50 per cent of the tubes in the cracking-still furnace are inaccessible on the outside and other tubes, more directly exposed to the fire, are covered with a tight adhering scale that might easily prevent accurate determination of the exterior condition or diameter of the tube. Certainly the most desirable and direct measurement is one of tube-wall thickness. Neglecting metallurgical deterioration or incipient cracking, direct tube-wall thickness measurements would establish the ability of the tube to continue in service. However, no really successful instrument for directly measuring wall thickness has been offered to the refinery inspector or developed by him.

Admitting, for the time at least, our inability to develop an instrument for the accurate measurement of tube-wall thickness, attention is turned to the procurement of a more useful and accurate tool for the determination of internal diameters. In addition to the importance of internal-diameter measurements, the problem of building a successful instrument to do the job has intrigued refinery mechanics, and as a result, a very large number of useful tools as well as many unworkable gadgets have been constructed. This paper discusses one of the more successful tools which has proved entirely practicable and is now in use in several refineries.

Development of the internal electro-caliper follows the specifications for such a device set forth by inspection engineers themselves. These specifications require that a direct-reading dial be employed, that the accuracy of measurement would permit close determination of corrosion losses, and that measurement could be made in any diametrical plane. Further, accurate measurement of small pockets or grooves is desired, as is ruggedness and rapid manipulation in order not to extend unduly the off-stream time of the furnace. The device offered that seems best to fit the majority of these requirements is shown assembled in Fig. 1.

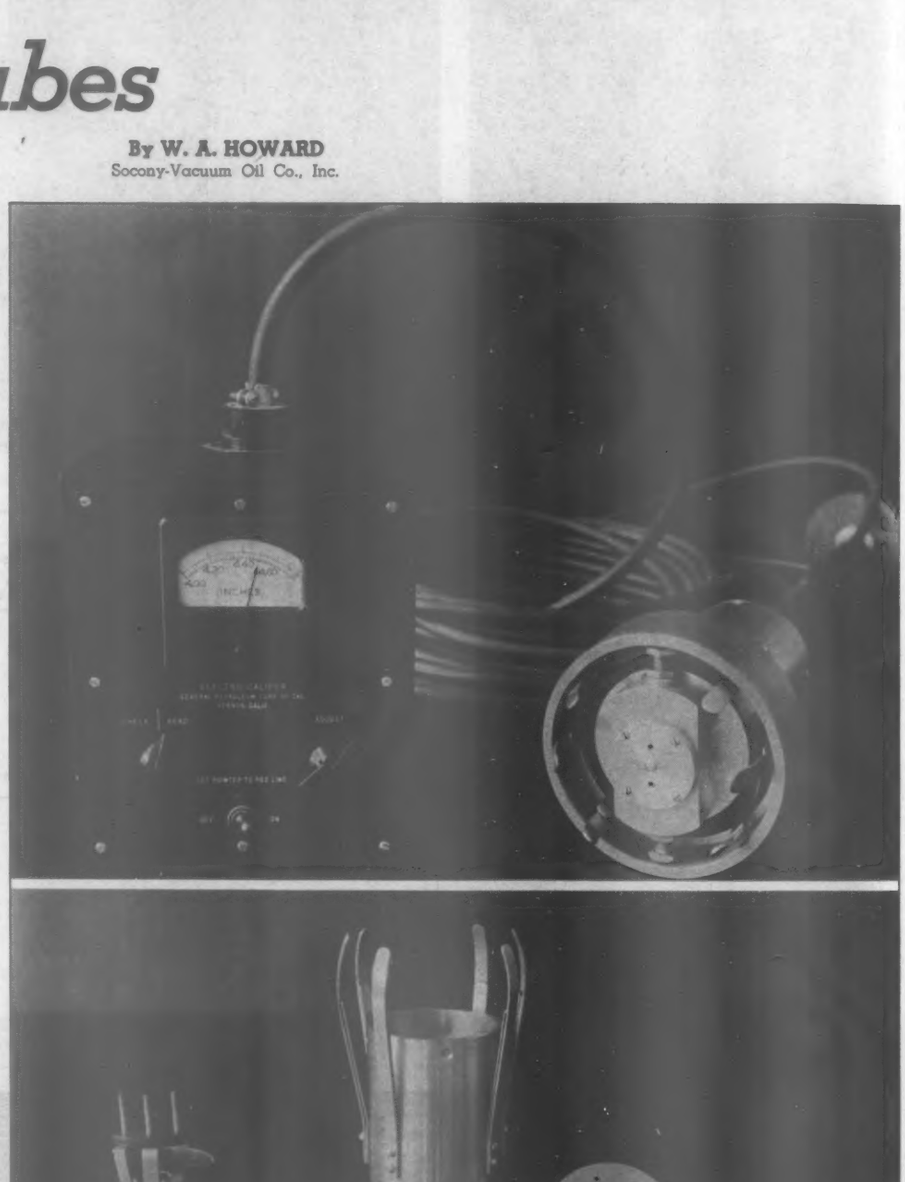


Fig. 1 (Top)—Showing gaging head inserted in a check ring, electric conductor cable and meter box. Note that for proper dial adjustment meter reads 4.50 in., exact i.d. of check ring. Fig. 2 (Bottom)—Photograph of various parts of the gaging head

When the electro-caliper is used measurement is made by the motion within the tube of two opposing plungers or anvils expanded by spring pressure and geared to a rotating shaft which is common to both plungers. A special type of wire-wound potentiometer is mounted about the rotating shaft and the variation in voltage obtained through the potentiometer due to the movement of the anvils and the rotating of the potentiome-

ter arm is transmitted by a suitable electric circuit through a voltmeter having a dial calibrated directly in inches. The device consists of three essential parts, namely: (1) A gaging head consisting of engaging plungers, racks, gears and pinions, the potentiometer and rotating arm, all encased in a rust-resisting metal tube equipped with centering springs; (2) an instrument box containing the voltmeter, batteries, switches and balancing resistance, all encased in a neat wooden box with a front panel of bakelite; (3) several 6-ft. sections of light rust-resisting metal tubing used for propelling the gaging head through the tube to be measured. These propelling tubes are joined by a quick-acting bayonet type self-locking connection.

The gaging head is constructed for the minimum diameter tube to be measured. The range of measurement for any single set of anvils is ¾ in. For tubes of a large size, anvil extensions and additional sets of centering springs expanded to fit tightly into the tube to be measured are provided. The anvils are faced with stellite or other extremely hard material and then ground to shape in order to minimize wear. The anvils are easily removable and can be readjusted or replaced in case excessive wear does occur.

The scale of the meter shown in Fig. 1 is divided into divisions representing 0.02 in. Actually one-fourth division may be estimated resulting in a reading of 0.005 in. The device is truly accurate to this degree, enabling accurate determinations of internal-tube corrosion. Also is shown a ground and hardened ring for checking the calibration of the device.

Fig. 2 shows the various parts entering into the construction of the gaging head. The great accuracy obtained is largely due to the care used in manufacturing these parts of the instrument. All of the gear shafts operate on ball bearings and lost motion in the gear train is removed by the application of proper spring tension balanced against the load on the anvils. Long life of these parts is assured by enclosing all of the moving parts in a dust and oilproof case.

The device shown in the photographs is calibrated for use in 4-in. i.d. tubes. However, as mentioned, the anvils are adjustable or can be made of any length providing means of measuring tubes smaller or larger. The dial can be calibrated to indicate the increase in diameter over any given zero setting rather than to indicate the actual diameter in inches, should such readings be desirable. Automatic recording attachments can easily be adapted to the method of gaging used in this device and considerable thought has been given to the desirability of such an attachment. The idea, however, has been discarded as not worth the cost of additional equipment involved or the labor and expense of analyzing and filing the recorded charts. Instead, readings are recorded on suitable log sheets as described later.

Electrical Circuit Important

The electrical circuit used in the electro-caliper is of equal importance to its mechanical features. In developing the instrument it was desired to use an electrically operated measuring circuit that would allow remote indication and promote portability. It was necessary for the circuit to be as free as practicable from temperature and movable contact errors; to allow the electrical circuit to be checked during its use; to be portable and to stand a reasonable amount of rough handling. The circuit finally adapted is shown in Fig. 3 and is essentially an elementary type of deflection potentiometer. A fixed current is passed through a fixed resistance resulting in a linear voltage drop along this resistance. The measuring anvils are coupled to an arm moving along this resistance and the voltage drop is measured to indicate the distance between the anvils or the actual inside diameter of the tube. The potentiometer is uniformly wound of low-temperature coefficient wire, with a current-carrying capacity greatly in excess of that actually used—this to minimize changes in resistance of the winding due either to flow of current or to temperatures resulting from insertion of the instrument in a hot tube.

The meter is a microammeter range 0/50, shunted to give acceptable damping and with sufficient series resistance to result in a voltmeter of 7-volt range and a resistance of 10,000 ohms per volt. The measuring circuit resistance is kept high in order to minimize the effect of contact resistances and to keep it from noticeably shunting the fixed resistance. This helps to give a scale uniform enough to permit horizontal offsetting, and to allow a one-point check against a check ring when reassembling and calibrating the instrument.

The measuring head, and its connecting leads, was tested for the effect of temperature upon the electrical circuit. A deflection of less than 1 per cent of the full-scale reading, or about 0.007 in. was observed between room temperature and 200° F.

The only movable contacts in series with the fixed resistance, beyond the point of measurement, are in the three-pole polarized plug used to connect the leads to the instrument case. A Hubbell twist-lock receptacle rated at 10 amp., 250 volts, was used. This plug wipes and cleans the contacts each time it is used and so far no measurable change in resistance at this point has been found.

In practice the electro-caliper is used after the tubes are cleaned and may be operated by one or two men depending upon the time available for tube inspection or upon the number of tubes to be surveyed. When two men are used, one man

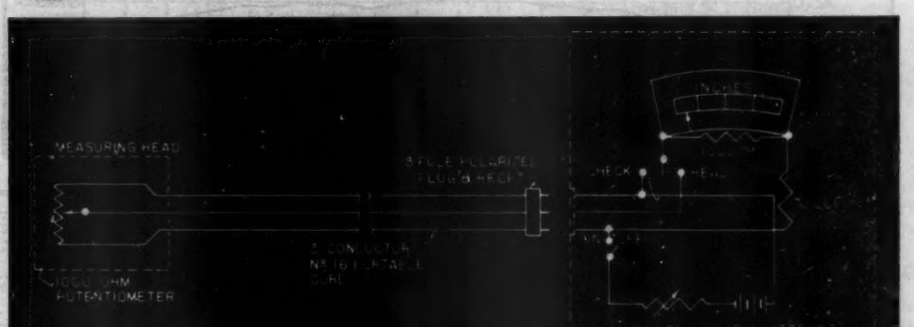
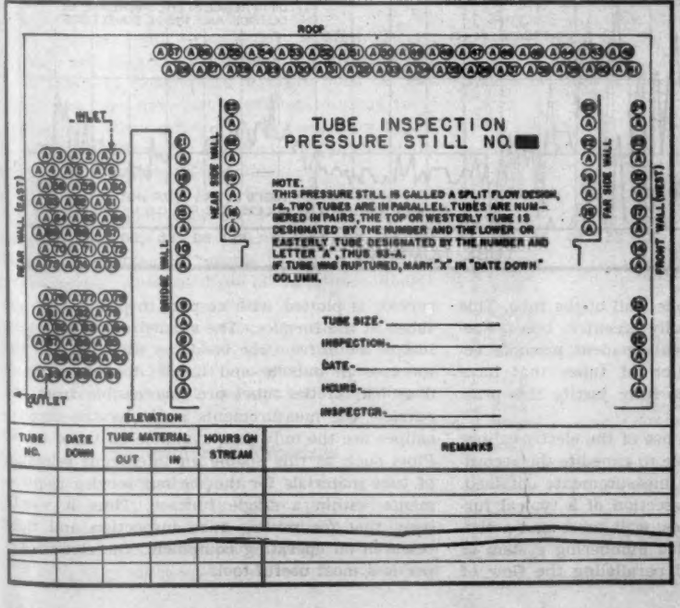


Fig. 3 (Right)—Electrical circuit of electro-caliper. Fig. 4 (Below)—Diagram of pressure still which is key to tube location for office records and for use by field inspectors. Fig. 5 (Below, right at top)—Data sheet for recording inspection measurements of still tubes. Fig. 6 (Below, right, at bottom)—Still tube office record


ROOF
INLET
OUTLET
REAR WALL (EAST)
NEAR SIDE WALL
BRIDGE WALL
FAR SIDE WALL
FRONT WALL (WEST)
ELEVATION
TUBE INSPECTION
PRESSURE STILL NO.
NOTE.
THIS PRESSURE STILL IS CALLED A SPLIT FLOW DESIGN, i-e., TWO TUBES ARE IN PARALLEL. TUBES ARE NUMBERED IN PAIRS, THE TOP OR WESTERLY TUBE IS DESIGNATED BY THE NUMBER AND THE LOWER OR EASTERLY TUBE DESIGNATED BY THE NUMBER AND LETTER "A", THUS 93-A.
IF TUBE WAS RUPTURED, MARK "X" IN "DATE DOWN" COLUMN.
TUBE SIZE-
INSPECTION-
DATE-
HOURS-
INSPECTOR-

TUBE NO.	DATE DOWN	TUBE MATERIAL OUT	TUBE MATERIAL IN	HOURS ON STREAM	REMARKS

TUBE INSPECTION

INSPECTION NO._____ RUN NO._____ DATE_____

TOTAL HOURS ON STREAM_____ INSPECTED & RECORDED BY_____

STILL OR UNIT_____

TUBE NO.	MAXIMUM I.D. HORIZ.	MAXIMUM I.D. VERT.	MAXIMUM I.D. LOCATION ⊕	MAXIMUM O.D. HORIZ.	MAXIMUM O.D. VERT.	MAXIMUM O.D. LOCATION	REMARKS

STILL TUBE RECORD

STILL OR UNIT_____ TUBE MATERIAL_____ TUBE NO._____

NOMINAL O.D._____ I.D._____ WALL_____ RETIREMENT O.D._____ I.D._____ WALL_____

ALLOWABLE SKIN TEMP._____ OIL TEMPERATURE_____ OIL PRESSURE_____

DATE	INSP'S. NO.	RUN NO.	STREAM HOURS	MEASUREMENTS O.D.	MEASUREMENTS I.D.	MEASUREMENTS WALL	⊕ REMARKS

propels the device through the tubes, attaching and disengaging the bayonet-type jointed propelling tubes, and the second man reads and records the data desired. Usual practice is to pass the device through the tube in a vertical plane, rotate the anvils to a horizontal plane at the far end of the tube and withdraw the device in this position. Propelling tubes are oriented with the gaging anvils so that the diametrical position of the anvils is always known. The propelling tubes are marked off in increments of length so that the distance of the measuring anvils from the end of the tube is also always known. Readings may be recorded in any increment of the tube length and in any plane. If, during either of these traverses, a suspiciously large reading is obtained, the area may be then more thoroughly explored, moving the gaging head forward and backward or rotating it in order to discover the largest diametrical dimensions and to thoroughly log the area. Ordinarily only the largest reading and the location of such a reading is recorded. A red line may be put on the scale of the meter corresponding to the largest permissible diameter of the tube so that if the scale pointer passes this line during a tube traverse, the tube will be retired. By way of further elaboration contacts can be placed at some maximum scale position causing a light to flash or a bell to ring indicating an oversize area in the tube. Thus the caliper becomes a "go" and "no go" gage. Tube inspections under such provisions can be made very rapidly.

External tube calipers equipped with dial gage to facilitate reading within the furnace are frequently used as a supplement to the electro-caliper. The internal measurements of certain tubes may then be presented by use of a graph plotted with respect to tube length. The external-diameter measurements may then be superimposed upon this graph to emphasize ring cuts, coke spots, corrosion and bulging. It is readily seen that the device serves not only for the routine type of inspection, enabling rapid decisions with respect to tube condition or retirement, but it may also be used for more precise work of a research nature to establish corrosion rates within certain sections of the furnace, erosion rates due to turbulence and incorrect header design, as well as for loss of metal resulting from tube cleaning.

Calipering the inside of pressure still tubes over their full length at regular intervals of service has been adopted by some refineries as standard practice. Usually the tubes are retired whenever the inside diameter at any point reaches a predetermined dimension, whether the increase over a nominal size is due to internal enlargement only, or to bulging or to both. Also, unless it can be otherwise established, it is assumed that all metal loss is from only one wall of the tube. This is actually the case in fully eccentric tubes. Factors that contribute to enlargement promote eccentricity and examination of tubes that have been retired from service fully justify this practice.

In connection with the use of the electro-caliper several forms are desirable to expedite the recording and retention of the measurements obtained. Fig. 4 represents a cross-section of a typical furnace containing roof tubes, wall tubes and a convection section. A suitable numbering system of the tubes has been used paralleling the flow of the oil through the furnace. Fig. 4 serves as a key chart to Fig. 5 which is a form suggested for use by the field men when the tubes are actually measured. Provision is made for recording the maximum horizontal and vertical internal diameter and to describe this measurement in terms of its distance from the end of the tube. The form shown in Fig. 6 serves as an individual tube office record containing essential operating information and space for recording periodic measurements of the tube. The recorded data can be reported in any conceivable number of ways by the use of charts or graphs. Tube temperatures and pressures as well as measurements of coke formation, scale, etc., can be superimposed upon such charts to give a complete picture of tube operation. In cases where no increase in outside diameter is detected, corrosion rates of the tube material can be expressed in any convenient units from internal measurements alone. There is, therefore, the possibility by the use of this device of securing data which may be used for run-by-run comparisons of corrosion losses. The several available types of maximum reading instruments are not suited for this purpose.

Fig. 7 is a typical plot of tube diameters with reference to their length. These data were taken during the inspection of tubes in a vis-breaker furnace after 7,366 hours of service. The tubes were originally 4-in. i.d. by 5-in. o.d. It may be noted that the increase in internal diameter is twice the increase in outside diameter over most of the tube length. The tubes have suffered both bulging and internal metal loss resulting in a reduced wall thickness. Furthermore, it is shown that this condition is more serious in the center of the tubes than at the ends. Obviously, end calipering would not supply this information.

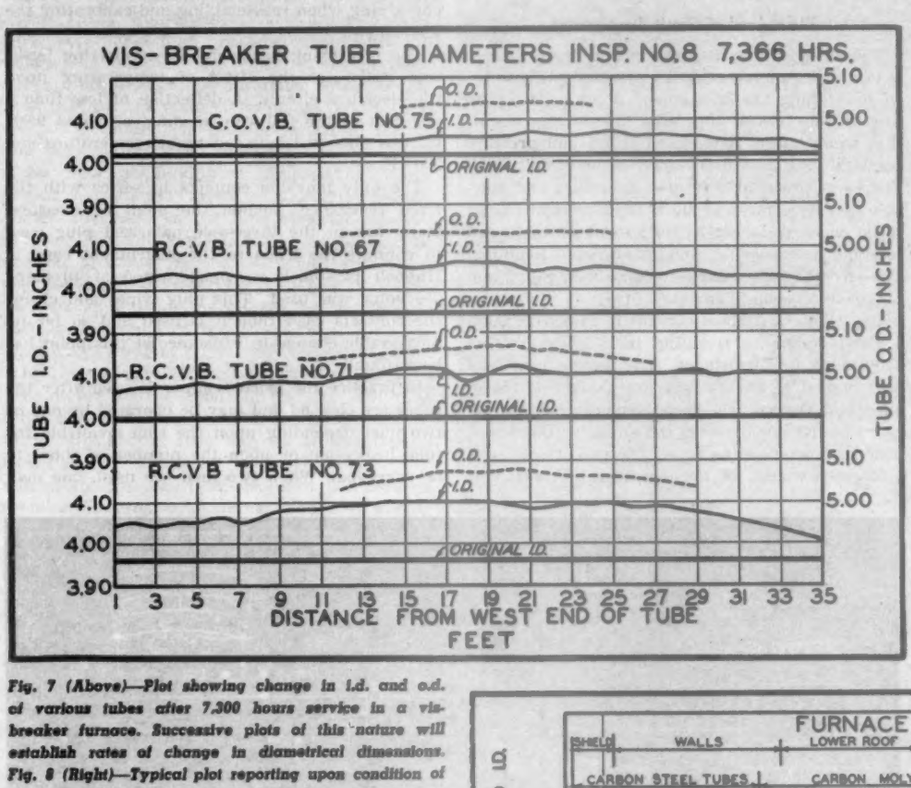
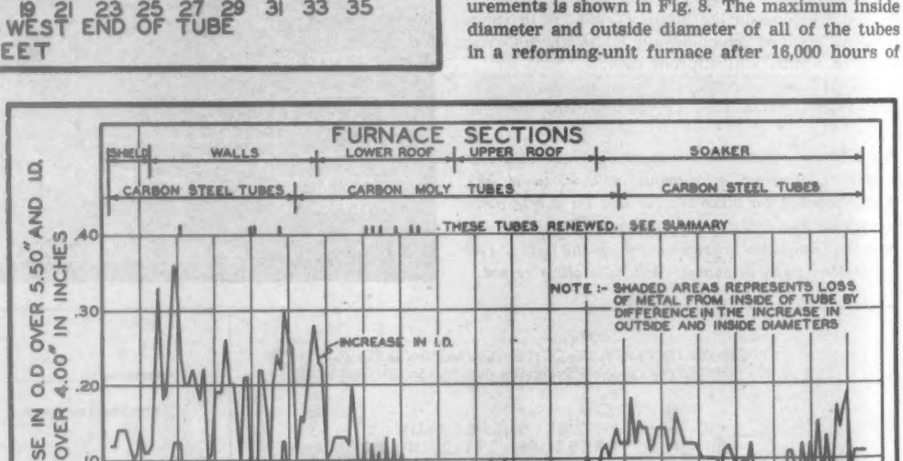


Fig. 7 (Above)—Plot showing change in i.d. and o.d. of various tubes after 7,300 hours service in a vis-breaker furnace. Successive plots of this nature will establish rates of change in diametrical dimensions. Fig. 8 (Right)—Typical plot reporting upon condition of tube in reforming unit after 16,000 hours on stream

Plotted After 16,000 Hours

A more complete story as given by tube measurements is shown in Fig. 8. The maximum inside diameter and outside diameter of all of the tubes in a reforming-unit furnace after 16,000 hours of service is plotted with respect to position of the tubes in the furnace. The shaded areas represent loss of metal from the inside by difference in the increase in outside and inside diameters. Since over half of the tubes are inaccessible from the outside, the measurements made by the electro-caliper are the only data available on these tubes. Plots such as this enable an intelligent selection of tube materials for the various service requirements within a single furnace. Thus it would seem that for routine tube inspection and field research on operating equipment, the electro-caliper is a most useful tool.


FURNACE SECTIONS
SHIELD
WALLS
LOWER ROOF
UPPER ROOF
SOAKER
CARBON STEEL TUBES
CARBON MOLY TUBES
CARBON STEEL TUBES
THESE TUBES RENEWED. SEE SUMMARY
NOTE :- SHADED AREAS REPRESENTS LOSS OF METAL FROM INSIDE OF TUBE BY DIFFERENCE IN THE INCREASE IN OUTSIDE AND INSIDE DIAMETERS
INCREASE IN I.D.
INCREASE IN O.D.
TUBES IN THIS AREA NOT ACCESSIBLE FOR O.D. MEASURMENTS
INCREASE IN O.D OVER 5.50" AND I.D. OVER 4.00" IN INCHES
.40
.30
.20
.10
0
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
TUBE NUMBERS

Autoxidation and Gum-Forming Tendencies . . of Certain Hydrocarbons

By BERNARD BERGER and R. W. BOST
University of North Carolina

WITH the introduction of the use of cracked gasoline for motor fuel, the tendency of the gasoline to form oxygenated derivatives is greatly increased over that of straightrun gasoline. These oxygenated derivatives have a detrimental effect on the gasoline in that they are either resinous materials (gums) themselves or in many cases they are the precursors of gums. Investigators who have worked on the problem of gum formations, have not attempted to isolate any of the hydrocarbons in gasoline but they have attempted, by various means, to show what types of hydrocarbons might be responsible for those undesirable products. Attempts have also been made to gain some knowledge of the structure of a gum by studying the gum obtained from gasoline. This is almost a hopeless task since gasoline contains many hydrocarbons of diverse structures. It is obvious, therefore, that any attempt to study the mechanism of gum formation as well as the structure of gum itself is almost futile unless a substance of known structure is used as the starting material.

This study was undertaken with a view of attempting to show the relationship between the structure of a pure hydrocarbon and its tendency to form oxygenated derivatives and gums. Quantitative determinations of certain of these oxygenated drivatives of pure hydrocarbons were made at definite intervals in order to follow more accurately the breakdown of a hydrocarbon, and to obtain a clearer picture as to the mechanism of gum formation and the structure of a gum itself.

The peroxide and coupling tendencies of pure compounds of the cyclopentadiene type and of substituted ethylenes, have been studied by Stobbe[1], and Staudinger[2] respectively. However, these investigators did not attempt to make quantitative measurements on the amounts of peroxides and gums formed under the conditions of their experiments. Other workers in this field, among whom should be mentioned Cassar[3], Martin, Gruse, and Lowry[4], Flood, Hladky, and Edgar[5], Cundea and Crustodule[6], Morrell, Dryer, Lowry, and Egloff[7], have studied the effect of certain types of unsaturated hydrocarbons on gasoline, but they have not attempted to study these compounds when present in the pure state by the methods developed for the study of the chemistry of the autoxidation of gasoline.

In order to study the effect of structure on gum-forming tendencies, eight hydrocarbons were selected. Four of them, pinene, limonene, cyclohexene and tetralin, belong to the unsaturated cyclic series, whereas three of the others, diallyl, 2-methyl-butene-2 and diisobutylene, are unsaturated acyclic hydrocarbons. Isooctane, 2,2,4-trimethyl pentane, was the only saturated hydrocarbon studied. Thus, it is seen that quite a representative number of hydrocarbons of different structures was taken.

Preparation of Materials

Diallyl and 2-methyl-butene-2 were prepared by well-established methods. The preparation of diallyl was by the method of Berthelot and Luca[8]. Allyl iodide was treated with metallic sodium and the desired product separated from the solid mass which formed, by distillation. The dehydration of tertiary amyl alcohol by dilute sulfuric acid, Fieser[9], gave a good yield of 2-methyl-butene-2.

The purification of the materials used in this study involved the utilization of physical as well as of chemical means. Cyclohexene peroxide was destroyed by allowing the cyclohexene to stand in contact with powdered copper for at least a week. Unsaturated hydrocarbons were removed from isooctane by means of sulfuric-nitric acid mixture. These two compounds as well as diallyl, diisobutylene, and 2-methyl-butene-2 were fractionally distilled at atmospheric pressure by means of a Widmer column. A 3-ft. vacuum-jacketed column packed with glass helixes was used for the fractional distillation of pinene and limonene at reduced pressure. Tetralin was also purified by distillation at reduced pressure but a 1½-ft. bubble cap column was substituted for the one mentioned above.

Substance—	Boiling point, °C.	Refractive index, N°_{D}
Pinene	52.0-52.1 at 20 mm.	1.4688
Limonene	70.0-70.1 at 20 mm.	1.4743
Cyclohexene	82.6-82.7 at 752 mm.	1.4450
Tetralin	97.0-97.2 at 24 mm.	1.5903
2-Methyl-butene-2	38.2-38.3 at 750 mm.	1.3860
Diisobutylene	100-105 at 756 mm.	1.3925
Isooctane	99.0-103.0 at 756 mm.	1.3982
Diallyl	59.0-59.2 at 752 mm.	1.4014

The isooctane gave negative bromine and permanganate tests.

Experimental Procedure

In order to study the stability of the hydrocarbons, the following procedure was devised. In each of twenty-four 65-cc. ampoules, were placed 20 cc. of a pure hydrocarbon. Another set of 24 contained 20 cc. of a second hydrocarbon. In the same manner the other six hydrocarbons were placed by means of a burette into sets of 24 ampoules, each ampoule containing 20 cc. of the pure hydrocarbon. Each set was divided into four groups of six ampoules per group. To Group A, nothing was added; to the second, B, 0.2 grams of benzoyl peroxide; to the third, C, 0.2 cc. of butyraldehyde; to the last, D, 0.2 cc. of acetic acid. All the ampoules were sealed and placed in a horizontal position on a frame on the roof of a three-story building where maximum light effect could be obtained.

It is noteworthy that the amount of available oxygen was limited and constant. Each ampoule contained approximately 45 cc. of air which gave 9 cc. of oxygen per ampoule. Other factors such as light and temperature effects were the same for all the ampoules. The average temperatures over the 3-month period are listed:

Time	Average temperature, °C.
First 2 weeks	35.0
Second 2 weeks	34.5
Third 2 weeks	27.0
Fourth 2 weeks	34.0
Fifth 2 weeks	34.8
Sixth 2 weeks	35.6

Several of the ampoules were analyzed for the transmissive properties of the glass. It was found that 92 per cent of the light in the visible spectrum was transmitted. The thickness of the glass was approximately 0.017 cm.

Analyses

Thirty-six ampoules, one of each substance both in the pure condition and with the added substances, were removed and analyzed fortnightly over a period of 3 months for peroxide, acid, and gum content.

Determination of peroxides.—For the peroxide a modification of the method of Young, Vogt, and Nieuwland[10] was followed. In place of the procedure worked out by the above authors, the following was substituted. To each of 4 cc. of the reagent in each of 30-cc. beakers, were added 2.0 cc. of the unknown and 10 cc. of methyl alcohol. (In later experimental work it was found that the use of larger quantities of the reagent without dilution, was advisable). The mixtures were stirred and colors were compared in a colorimeter to a standard solution in a 30-cc. beaker. A blank determination was run in conjunction with each set of six. The standards ranged in concentration from 0.00005 to 0.001 mol of FeCl,

TABLE 1—PINENE

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		4.455	0.0	4956	35
2 weeks	Benzoyl peroxide	0.500	26.38	5032	35
2 weeks	Butyraldehyde	0.200	91.66	2378	35
2 weeks	Acetic acid	0.0	95.45	1974	35
4 weeks		0.585	0.59	1822	34.5
4 weeks	Benzoyl peroxide	0.353	23.97	7510	34.5
4 weeks	Butyraldehyde	0.432	75.45	1745	34.5
4 weeks	Acetic acid	0.116	119.65	1101	34.5
6 weeks		0.306	3.54	440.0	27
6 weeks	Benzoyl peroxide	0.663	19.16	2800	27
6 weeks	Butyraldehyde	0.343	100.55	1015	27
6 weeks	Acetic acid	0.306	127.23	679.0	27
8 weeks		6.888	2.61	1113	34
8 weeks	Benzoyl peroxide	0.093	23.29	3275	34
8 weeks	Butyraldehyde	0.303	84.16	1213	34
8 weeks	Acetic acid	1.638	127.78	508.1	34
10 weeks		3.456	1.23	760.4	34.8
10 weeks	Benzoyl peroxide	3.043	23.81	2379	34.8
10 weeks	Butyraldehyde	0.0	85.84	452.3	34.8
10 weeks	Acetic acid	0.171	137.93	385.7	34.8
12 weeks		1.610	0.876	679.0	35.6
12 weeks	Benzoyl peroxide	1.365	27.73	1587	35.6
12 weeks	Butyraldehyde	1.350	76.05	525.5	35.6
12 weeks	Acetic acid	0.007	134.88	931	35.6

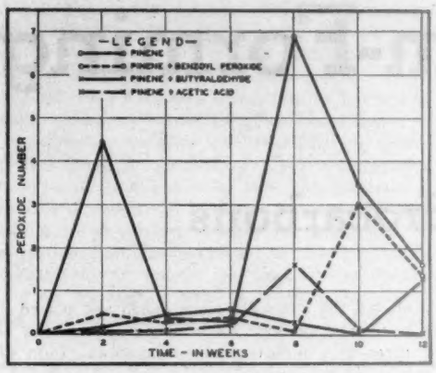


Fig. 1

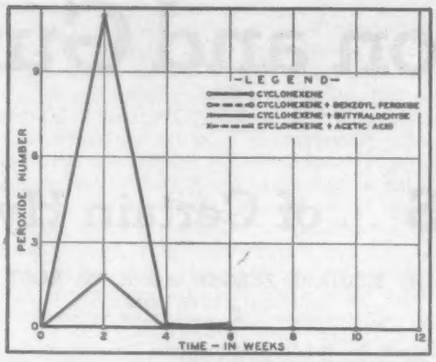


Fig. 2

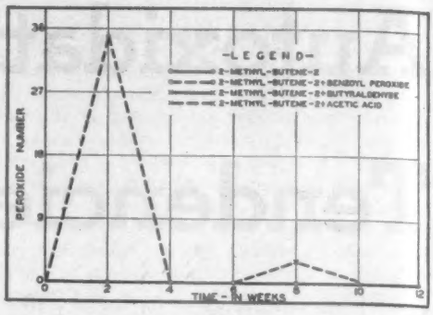


Fig. 3

per liter. In all cases, the standards were comparable in color to the unknown.

Determination of acids.—Acid concentration was determined in the following manner. To 2 cc. of the hydrocarbons in a 30-cc. beaker were added 10 cc. of absolute ethyl alcohol and the mixture was stirred vigorously. Phenolphthalein was added. The resulting solution was titrated with approximately 0.03 *N* sodium hydroxide.

Determination of gums.—The following method was employed for the estimation of the gum content of the various hydrocarbons. Ten cc. of the hydrocarbon were evaporated in a tared glass dish at 110°-120° C. This gave the preformed gum. For formed gum, the remainder of the hydrocarbons in the ampoule was evaporated. The gum and the ampoule were weighed. By dissolving the gum in acetone, the weight of the ampoule and therefore the weight of the formed gum, could be determined.

The results are expressed in peroxide, acid, and gum numbers.

Molecular weight of gums.—Since gums have a limited solubility in most solvents, the molecular weights of several of the gums were determined from the elevation of the boiling point of pure acetone. Also, since gums are known to be composed of units of varying lengths, the molecular weights which were obtained should be considered as "mean molecular weights" as opposed to "true molecular weights" of pure compounds.

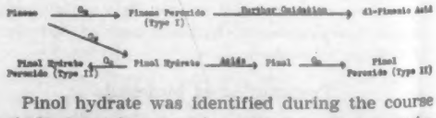
Discussion of Results

Under the experimental conditions as previously described, various oxygenated derivatives of the hydrocarbons are possible. If energy of activation is necessary for all autoxidations, which is seriously questionable since freshly distilled cyclohexene when placed in a dark-colored bottle on standing gave a peroxide test, this energy could be supplied by actinic rays. It can be seen, therefore, that conditions favorable to autoxidation were present.

Tables 1-8 show the results of the peroxide, acid, and gum analyses for both the pure hydrocarbons and for those in which the added substances were present.

Engler[11] and Jorissen and Van der Beck[12], as well as other workers, have shown that peroxides are unstable in the light. The results obtained in this study are, in general, in agreement with those obtained by the previous investigators. At different stages of the experiment small quantities of peroxide were found to be present but at no time, in most cases, were there any appreciable amounts.

With the exception of 2-methyl-butene-2 in which some of benzoyl peroxide remained even after 2 weeks, the pure hydrocarbons of Group A showed the greatest tendency to form peroxides. Figs. 1-3 show the variations of the peroxide numbers of some of the hydrocarbons with time. Since in all the other cases appreciable amounts of acids were present due to the addition of the benzoyl peroxide, butyraldehyde, and acetic acid, it may be inferred that in the light, acids tend to favor the decomposition of peroxides. On the other hand, since there was only a limited amount of oxygen present, some of the oxygen which might have been used to form a hydrocarbon peroxide, was used to oxidize the butyraldehyde to butyric acid. At different time intervals it was noted that one could not predict whether peroxides would be at a maximum or not. This is probably due to the fact that more than one type of peroxide may form. Peroxides of the pure hydrocarbon (Type I) as well as peroxides of some of the hydrocarbon derivatives (Type II), may have been present. For example, in the case of pinene, some of the possible peroxides and oxygenated derivatives are:



Pinol hydrate was identified during the course of the experiment. After the ampoules containing pure pinene were on the roof for 1 month, white needles were observed on the upper end of the ampoules. The above-mentioned compounds are only some of the most likely peroxides and

TABLE 3—CYCLOHEXENE

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		10.951	2.33	89.30	35
2 weeks	Benzoyl peroxide	0.0	23.02	433.4	35
2 weeks	Butyraldehyde	1.840	86.95	212.5	35
2 weeks	Acetic acid	0.0	77.90	175.9	35
4 weeks		0.119	0.32	165.3	34.5
4 weeks	Benzoyl peroxide	0.044	15.00	203.0	34.5
4 weeks	Butyraldehyde	0.033	91.60	79.70	34.5
4 weeks	Acetic acid	0.081	129.05	99.80	34.5
6 weeks		0.0	0.0	47.90	27
6 weeks	Benzoyl peroxide	0.0	11.76	260.4	27
6 weeks	Butyraldehyde	0.0	90.99	156.6	27
6 weeks	Acetic acid	0.0	149.11	84.60	27
8 weeks		0.002	2.19	89.00	34
8 weeks	Benzoyl peroxide	0.006	13.32	298.0	34
8 weeks	Butyraldehyde	0.184	76.93	86.20	34
8 weeks	Acetic acid	0.001	125.39	82.20	34
10 weeks		0.0	1.75	29.90	34.8
10 weeks	Benzoyl peroxide	0.028	13.13	189.2	34.8
10 weeks	Butyraldehyde	0.0	76.95	84.10	34.8
10 weeks	Acetic acid	0.095	142.60	43.90	34.8
12 weeks		0.0	0.70	149.0	35.6
12 weeks	Benzoyl peroxide	0.003	12.38	470.3	35.6
12 weeks	Butyraldehyde	0.001	81.25	109.2	35.6
12 weeks	Acetic acid	0.010	124.15	79.60	35.6

TABLE 2—LIMONENE

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		6.394	0.0	5630	35
2 weeks	Benzoyl peroxide	0.0	10.71	6984	35
2 weeks	Butyraldehyde	0.0	94.05	5169	35
2 weeks	Acetic acid	0.0	95.95	6209	35
4 weeks		5.070	0.19	4911	34.5
4 weeks	Benzoyl peroxide	0.0	10.07	6120	34.5
4 weeks	Butyraldehyde	1.590	90.12	3656	34.5
4 weeks	Acetic acid	1.365	128.50	4629	34.5
6 weeks		0.0	2.04	3276	27
6 weeks	Benzoyl peroxide	0.0	33.44	5212	27
6 weeks	Butyraldehyde	0.0	75.21	4433	27
6 weeks	Acetic acid	0.331	154.49	2929	27
8 weeks		2.679	1.32	2980	34
8 weeks	Benzoyl peroxide	0.740	13.52	3125	34
8 weeks	Butyraldehyde	3.750	100.40	3552	34
8 weeks	Acetic acid	0.897	132.45	2509	34
10 weeks		0.534	1.75	2051	34.8
10 weeks	Benzoyl peroxide	0.528	13.24	5131	34.8
10 weeks	Butyraldehyde	0.039	93.86	2446	34.8
10 weeks	Acetic acid	0.0	125.80	2608	34.8
12 weeks		0.436	1.18	4349	35.6
12 weeks	Benzoyl peroxide	0.410	10.74	3625	35.6
12 weeks	Butyraldehyde	0.0	93.05	4589	35.6
12 weeks	Acetic acid	0.0	140.70	3158	35.6

TABLE 4—TETRALIN

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		0.0	0.0	4558	35
2 weeks	Benzoyl peroxide	0.0	46.20	2616	35
2 weeks	Butyraldehyde	0.0	74.45	3016	35
2 weeks	Acetic acid	0.0	86.95	5598	35
4 weeks		0.900	0.43	3335	34.5
4 weeks	Benzoyl peroxide	0.0	60.18	5663	34.5
4 weeks	Butyraldehyde	0.0	60.84	6483	34.5
4 weeks	Acetic acid	0.613	102.41	3530	34.5
6 weeks		0.0	3.20	1895	27
6 weeks	Benzoyl peroxide	0.0	55.19	3047	27
6 weeks	Butyraldehyde	0.0	50.33	1410	27
6 weeks	Acetic acid	0.0	123.44	1921	27
8 weeks		0.211	3.86	1125	34
8 weeks	Benzoyl peroxide	0.093	50.67	2627	34
8 weeks	Butyraldehyde	0.111	72.70	1417	34
8 weeks	Acetic acid	0.061	135.03	2683	34
10 weeks		0.113	1.23	1218	34.8
10 weeks	Benzoyl peroxide	0.0	63.60	3740	34.8
10 weeks	Butyraldehyde	0.0	83.05	2185	34.8
10 weeks	Acetic acid	0.0	143.85	3004	34.8
12 weeks		0.0	1.31	2215	35.6
12 weeks	Benzoyl peroxide	0.0	46.78	2992	35.6
12 weeks	Butyraldehyde	0.497	92.45	5466	35.6
12 weeks	Acetic acid	0.0	124.27	2544	35.6

esting. Clover and Richmond[13] have shown that the decomposition of benzoyl peroxide led to the formation of benzoic acid. In this work benzoic acid was isolated and identified after the benzoyl peroxide was allowed to react with the unsaturated hydrocarbons. In the case of diallyl the formation of benzoic acid was very noteworthy. In this case during the evaporation of the hydrocarbon the acid separated in rather pure condition from the gum. Since practically all of the benzoyl peroxide was destroyed, the acid number for the hydrocarbons should have been 41.3. Low acid numbers were found for all the substances except for tetralin and diallyl. Acid formation was favored in these two cases. In a like manner low acid numbers were found for all the substances, 2-methyl-butene-2 excepted, which contained butyric acid (from butyraldehyde) and acetic acid. There are three ways in which one could account for the removal of the acids.

1. The acids decompose in the sunlight under the influence of peroxides.

2. Acids add to the double bonds of the unsaturated compounds. Thus:

$$\begin{array}{c|c} C=C & \end{array} + HOOCR \longrightarrow H-\begin{array}{c|c} C & C \end{array}-OOCR$$

3. Acids combine with hydroxyl groups which are formed under the conditions of the experiment. Thus:

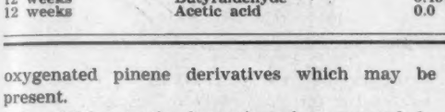
$$-\overset{|}{C}-OH + HOOCR \longrightarrow -\overset{|}{C}-OOCR + H_2O$$

From Fig. 6 it can be seen that the acid curves for diallyl lie rather close together, whereas in most of the other cases there are appreciable distances between the acid curves.

All of the hydrocarbons, isooctane as well as the unsaturated ones, showed considerable gum-

oxygenated pinene derivatives which may be present.

In addition to the formation of oxygenated derivatives similar to the ones as outlined for pinene, the dienes, limonene and diallyl, might have formed mono and then diperoxides of the hydrocarbons themselves. This may, to some extent, explain the fact that the peroxide numbers of limonene and diallyl increased after a minimum peroxide content was detected. A possible mechanism for the autoxidation of limonene, would be:



A similar chain of reactions could be outlined for diallyl.

On the other hand since cyclohexene has a simple structure as compared to pinene and limonene, one might expect only one peak in the peroxide curves. This, as can be seen from Fig. 2, is the case.

Since all autoxidations are known to take place in an orderly, stepwise fashion, the next step in the process would lead chiefly to the formation of aldehydes and ketones. Negative tests for aldehydes were obtained with Schiff's reagent. Undoubtedly what aldehydes did form were immediately oxidized to acids. No tests were made for ketones.

Under the conditions of the experiment only a slight acidity was detected in those ampoules of Group A which contained only air and the pure hydrocarbons. The oxygen present in the ampoules was probably utilized to form derivatives other than acids. Figs. 4-7 show graphically the results of some of the acid analyses. From these figures it can be seen how differently the addition of benzoyl peroxide, butyraldehyde and acetic acid affected the acid numbers of the various hydrocarbons.

The cases in which benzoyl peroxide was added to the pure hydrocarbons, are extremely inter-

TABLE 5—2-METHYL-BUTENE-2

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		0.0	0.0	15.50	35
2 weeks	Benzoyl peroxide	34.834	14.51	50.00	35
2 weeks	Butyraldehyde	1.334	8.84	9.00	35
2 weeks	Acetic acid	13.534	158.55	16.15	35
4 weeks		0.018	1.19	66.40	34.5
4 weeks	Benzoyl peroxide	0.083	16.24	251.3	34.5
4 weeks	Butyraldehyde	0.046	44.70	40.00	34.5
4 weeks	Acetic acid	0.0	178.53	29.10	34.5
6 weeks		0.0	0.04	27.00	27
6 weeks	Benzoyl peroxide	0.0	17.09	293.0	27
6 weeks	Butyraldehyde	0.0	87.92	33.20	27
6 weeks	Acetic acid	0.0	205.75	16.00	27
8 weeks		0.0	2.15	18.00	34
8 weeks	Benzoyl peroxide	0.072	11.39	111.3	34
8 weeks	Butyraldehyde	0.063	87.88	13.00	34
8 weeks	Acetic acid	3.312	169.02	1.00	34
10 weeks		0.051	18.79	79.90	34.8
10 weeks	Benzoyl peroxide	....	....	....	34.8
10 weeks	Butyraldehyde	0.376	163.11	31.00	34.8
10 weeks	Acetic acid	0.0	1.05	16.00	34.8
12 weeks		0.0	0.88	30.0	35.6
12 weeks	Benzoyl peroxide	0.033	18.39	334.7	35.6

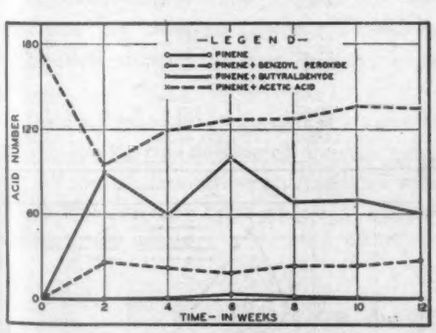


Fig. 4

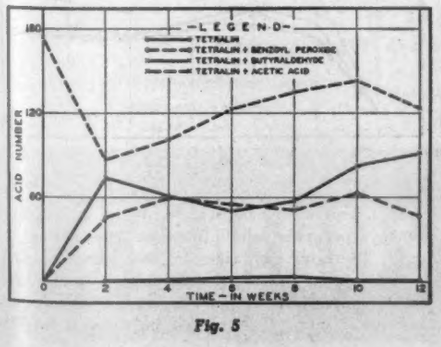


Fig. 5

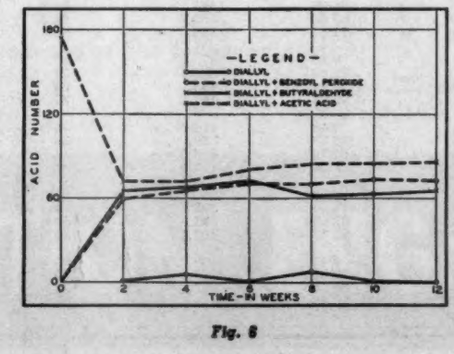


Fig. 6

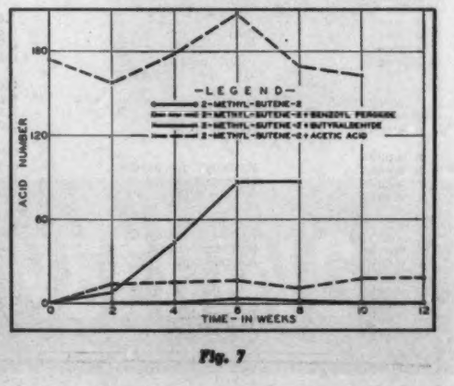


Fig. 7

forming tendencies both in the pure state (Group A) and with the added substances (Groups B, C, and D). Over the 3-month period the greatest amounts of gum were formed by the substituted cyclic hydrocarbons, limonene, tetralin, and pinene. The order of gum formation for the other five hydrocarbons was: diallyl, cyclohexene, diisobutylene, 2-methyl-butene-2, isooctane.

Most of the compounds reached a maximum as to gum content within the first 4 weeks. With slight variations, most of the hydrocarbons showed, for some definite period of time, a tendency to decrease in gum content as the length of exposure of the ampoules to the light was increased. This tendency, for four of the hydrocarbons, is shown by Figs. 8-9. Cyclohexene (Fig. 9) and 2-methyl-butene-2 in the presence of benzoyl peroxide also followed this trend but these two showed a great increase in gum content when analyzed at the close of the experiment. Decrease in gum content may be explained on the basis that gums, like some other compounds, peroxides for example, are not only formed in the light but also destroyed by it.

The addition of benzoyl peroxide favored gum formation in all the hydrocarbons except tetralin (Fig. 10). If oxygen is essential for gum formation, it can easily be seen why the addition of benzoyl peroxide would increase the amount of gum. Benzoyl peroxide in the decomposition would, among other things, have increased the amount of available oxygen and therefore the amount of gum. In tetralin this peroxide favored

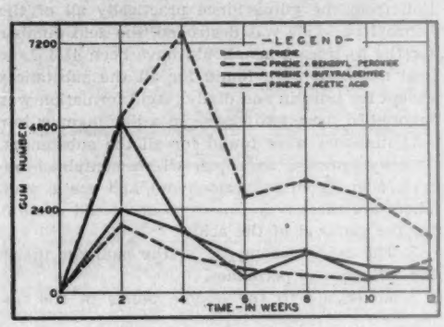


Fig. 8

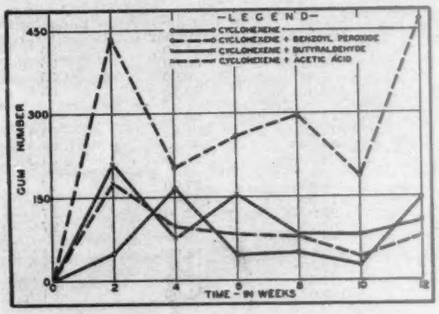


Fig. 9

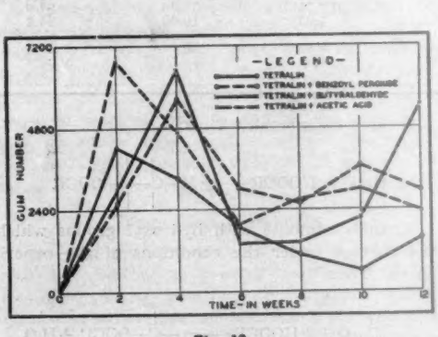


Fig. 10

TABLE 7—DIISOBUTYLENE

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		1.067	0.0	135.0	35
2 weeks	Benzoyl peroxide	0.0	19.33	640.0	35
2 weeks	Butyraldehyde	0.542	112.06	66.00	35
2 weeks	Acetic acid	0.542	130.50	119.0	35
4 weeks		0.063	2.00	201.8	34.5
4 weeks	Benzoyl peroxide	0.132	20.88	580.6	34.5
4 weeks	Butyraldehyde	0.132	106.46	247.4	34.5
4 weeks	Acetic acid	0.132	166.97	175.1	34.5
6 weeks		0.102	2.08	67.80	27
6 weeks	Benzoyl peroxide	0.128	19.04	603.5	27
6 weeks	Butyraldehyde	0.128	69.85	82.20	27
6 weeks	Acetic acid	0.128	159.08	90.70	27
8 weeks		0.040	4.52	46.70	34
8 weeks	Benzoyl peroxide	0.043	15.77	438.2	34
8 weeks	Butyraldehyde	0.104	96.20	38.30	34
8 weeks	Acetic acid	0.020	154.37	128.0	34
10 weeks		0.0	2.41	32.30	34.8
10 weeks	Benzoyl peroxide	0.0	17.52	218.0	34.8
10 weeks	Butyraldehyde	0.0	112.53	29.20	34.8
10 weeks	Acetic acid	0.0	151.32	113.0	34.8
12 weeks		0.039	1.13	43.80	35.6
12 weeks	Benzoyl peroxide	0.019	14.89	419.1	35.6
12 weeks	Butyraldehyde	0.0	87.17	22.40	35.6
12 weeks	Acetic acid	0.0	145.60	71.70	35.6

TABLE 8—ISOOCTANE

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		0.0	0.0	9.500	35
2 weeks	Benzoyl peroxide	0.0	33.48	313.2	35
2 weeks	Butyraldehyde	0.0	67.20	88.00	35
2 weeks	Acetic acid	0.0	105.06	29.00	35
4 weeks		0.0	0.30	44.50	34.5
4 weeks	Benzoyl peroxide	0.0	30.16	246.3	34.5
4 weeks	Butyraldehyde	0.0	93.35	42.00	34.5
4 weeks	Acetic acid	0.0	141.43	23.70	34.5
6 weeks		0.285	3.27	24.30	27
6 weeks	Benzoyl peroxide	0.0	16.87	325.5	27
6 weeks	Butyraldehyde	0.0	95.66	32.60	27
6 weeks	Acetic acid	0.0	139.80	36.20	27
8 weeks		0.0	3.50	22.80	34
8 weeks	Benzoyl peroxide	0.540	35.74	172.7	34
8 weeks	Butyraldehyde	0.0	87.60	26.50	34
8 weeks	Acetic acid	0.0	142.25	15.80	34
10 weeks		0.873	3.50	18.40	34.8
10 weeks	Benzoyl peroxide	0.443	32.51	255.6	34.8
10 weeks	Butyraldehyde	0.277	101.67	25.80	34.8
10 weeks	Acetic acid	0.330	144.55	21.00	34.8
12 weeks		0.094	3.50	26.60	35.6
12 weeks	Benzoyl peroxide	0.0	30.25	191.8	35.6
12 weeks	Butyraldehyde	0.022	93.07	24.60	35.6
12 weeks	Acetic acid	0.0	148.92	46.80	35.6

TABLE 9—DIALLYL

Period of time	Additional substance	Peroxide number	Acid number	Gum number	Average temperature (°C.)
2 weeks		1.334	0.385	396.8	35
2 weeks	Benzoyl peroxide	0.0	59.34	661.2	35
2 weeks	Butyraldehyde	0.0	66.43	477.6	35
2 weeks	Acetic acid	0.062	72.22	388.5	35
4 weeks		1.628	5.83	469.3	34.5
4 weeks	Benzoyl peroxide	0.388	65.92	1483	34.5
4 weeks	Butyraldehyde	0.339	67.03	565.2	34.5
4 weeks	Acetic acid	0.512	72.37	546.3	34.5
6 weeks		0.0	0.88	473.0	27
6 weeks	Benzoyl peroxide	0.0	71.64	932.7	27
6 weeks	Butyraldehyde	1.485	72.24	483.1	27
6 weeks	Acetic acid	0.0	80.92	447.1	27
8 weeks		0.337	6.48	414.3	34
8 weeks	Benzoyl peroxide	0.415	70.78	536.7	34
8 weeks	Butyraldehyde	0.525	61.70	404.9	34
8 weeks	Acetic acid	0.257	65.37	413.5	34
10 weeks		0.900	0.88	459.7	34.8
10 weeks	Benzoyl peroxide	0.455	73.75	593.7	34.8
10 weeks	Butyraldehyde	0.623	63.93	412.9	34.8
10 weeks	Acetic acid	0.176	85.42	397.4	34.8
12 weeks		2.780	0.49	409.0	35.6
12 weeks	Benzoyl peroxide	0.473	72.92	638.2	35.6
12 weeks	Butyraldehyde	0.691	65.55	432.1	35.6
12 weeks	Acetic acid	0.156	86.26	437.6	35.6

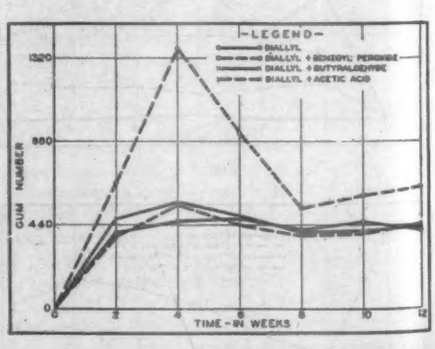


Fig. 11

Ten fractionation towers built by C-E for use in an atmospheric vacuum and topping unit designed by The Lummus Company.

This seven-car shipment is a single order for pressure vessels built by C-E for use in an atmospheric vacuum and topping unit of a large oil company. It comprises ten fractionation towers of many types which in the aggregate weigh 360,000 lbs. The variety in the sizes of the individual towers is indicated by the range of their weights and diameters. Two of the stripping towers weigh 5,500 lbs. each while one big stabilizer tower is 77,000 lbs. The smallest diameter is four feet, the largest thirteen.

This is further evidence of C-E's extensive facilities for the manufacture of pressure vessels used by the modern refinery... facilities which are available for any type of job... from the smallest to the largest.

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Other REFINERY VESSELS *built by* C-E

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C-E pressure vessels are produced at the following plants:

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COMBUSTION ENGINEERING

the formation of acids in preference to gums.

Although butyraldehyde and acetic acid did affect the amount of gum formed, the quantity of gum depended largely on the structure of the hydrocarbon. For example, as can be seen from Fig. 13, both the aldehyde and the acid decreased the amounts of gum when pinene was used. On the other hand, the gum-forming tendencies of diallyl (Fig. 11), was favored to some extent by these reagents.

In order to obtain sufficient quantities of the gums for analytical work, the following procedure was used. The hydrocarbon gums were first dissolved in acetone. The solutions were evaporated and the gums, which at this stage were of a resinous nature, were allowed to stand in the air for a length of time. In this manner the resinous materials were converted to powders.

Pinene, limonene, cyclohexene and tetralin gums were analyzed for carbon, hydrogen and oxygen content. The results of these analyses and the results of the determinations of the molecular weights for some of the gums are listed in Table 9.

Summary

1. Eight pure hydrocarbons of different structures were studied in direct sunlight in sealed ampoules, with the same volume of air with and without added substances over a 3-month period.

2. Quantitative determinations were made fortnightly for peroxides, acids, and gums.

3. Some of these results which are expressed in terms of peroxide, acid and gum numbers are plotted against time as shown by Figs. 1 to 11.

4. The significance of the peroxide and acid numbers with respect to gum formation has been discussed.

5. In certain cases gums have been isolated and studied quantitatively.

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TABLE 9—GUM ANALYSES

Gum—	M.P., °C.	Molecular weight	%C	%H	%O	Hydrocarbon units	Oxygen atoms
Pinene	85–90	504	71.92	9.31	18.77	3	6
Limonene	78–88	693	71.12	8.67	20.21	4	8
Cyclohexene		304	64.23	9.17	26.60	3	6
Tetralin		413	74.70	6.70	18.60	3	6
Diallyl	133–142	302					

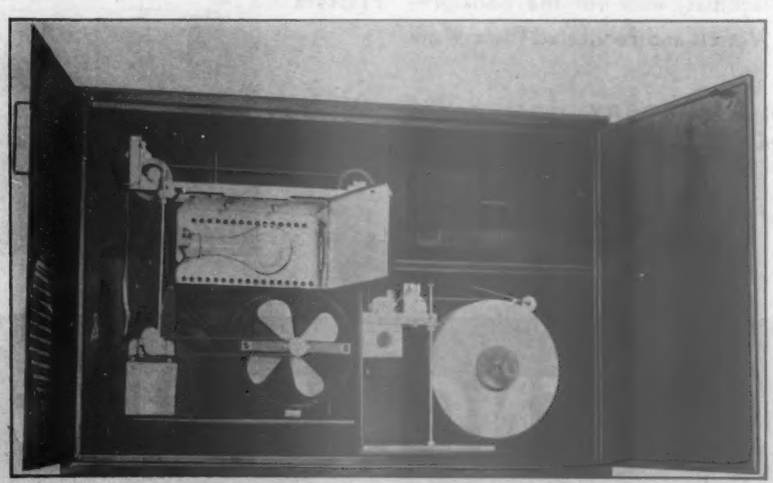
From Table 9 the indications are that the gums formed from the cyclic hydrocarbons contain two oxygen atoms per hydrocarbon unit. There appear to be at least three such units in a gum. Further work is necessary to establish the structure of gums. This will be reported later.

Hydrogen Sulfide Detector

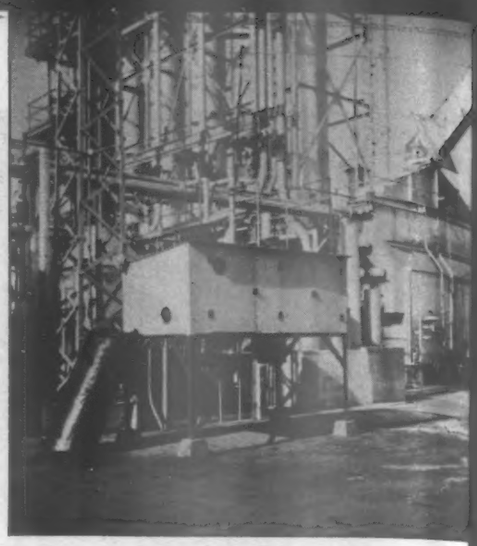
By FRED B. BEHRENS

Wilshire Oil Co., Inc.

WITH the erection of the nonselective polymer unit at the refinery of the Wilshire Oil Co., Inc., at Norwalk Calif., it was necessary to scrub the vapors free of hydrogen sulfide before processing in the polymer plant. In the interest of economy it was mandatory that the scrubbing method be a regenerative process which entailed the handling of hydrogen sulfide in a comparatively pure state—an exceedingly hazardous procedure. Usual safety precautions were the use of various detecting devices or enclosure of the plant proper in a "sealed can." Since most of these methods were quite costly, the Wilshire Oil Co. collaborated with B. O. Bushnell, Los Angeles engineer, and the result was the compact and efficient hydrogen sulfide detector here shown built at a reasonable cost.



View of gas detector removed from its mounting



View of gas detector mounted in the refinery in a transite housing for protection against weather and fire

Essentially the system consists of two parts: (1) The gas detector and alarm with instrument mountings on the door of the box enclosing the photo-cell, chemical supply, relay, etc. (The instruments may be mounted on a remote control panel with a strip chart recorder.). (2) The multipoint gas-gathering system with pressure and vacuum pumps, relief valves, air filter, blower, and motor.

The pump or compressor is sufficiently large to handle a volume of 20 cu. ft. per minute and pull a distance of 400 ft. through ½-in. sampling lines. Samples can be taken from 15 different stations. A synchronous motor-driven fan circulates the gas sample through an indicator box. This insures an even flow allowing for the calibration of the microammeter to give quantitative indications. A source of light shines into the indicator box and on to a photoelectric cell with a strip of moist lead-acetate-treated tape moving between the source of light and the cell. Should the gas sample contain appreciable amounts of hydrogen sulfide, a dark coating of lead sulfide is formed on the paper shutting off light to the cell which in turn operates the alarm system. This circuit may also be designed to operate blowers if necessary. After sampling, the line is cleared by the pump with air.

Recently this machine has been put to an excellent and novel use by members of the refinery staff. Closed heat exchangers operating on sour gas or gasoline vapors, where the pressure on the hydrocarbon side is greater than on the steam side, are a source of trouble and hazard due to a hydrocarbon vapor in the steam condensate used in the boiler house. Accordingly, detection of hydrocarbon leaks at the source is accomplished by constant bleeding of a steam sample from the exchanger, through a condenser, and thence into an open separating chamber. The sampling station for the detector is placed immediately above the open container. The condensate drips from the bottom of the pot while any lighter hydrocarbons containing H_2S due to a leak in the exchanger tend to rise and are picked up by the vacuum pump and transmitted to the detector. This system is of course applicable only where hydrogen sulfide would be present in the vapors.

The electrical measurements are sufficiently sensitive and accurate so that percentages well below the danger point can be detected. In spite of this the apparatus is rugged in construction and has operated in the open for well over a year with little attention except for replenishing the paper tape and chemical.

Graveyard gasoline

Two and a half million cars went to the motor graveyard in 1939 and more than one refiner's market went with them—refiners who make low octane gasoline

Consider the figures At an average of 725 gallons apiece (A. P. I. estimate) those cars used up a total of almost 2 billion gallons of gasoline a year—and their octane requirements were low

Who will use that low octane gasoline now?

Not the 3,244,000 new cars that went into service in 1939 and not the new cars coming out this year—they are mighty particular about their motor fuel

If you are making gasoline for cars that have gone to the scrap heap, here is a suggestion:

Make Dubbscracked gasoline for today's cars

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H. A. FOUTS, *Supt.*
The Texas Company
El Paso, Texas

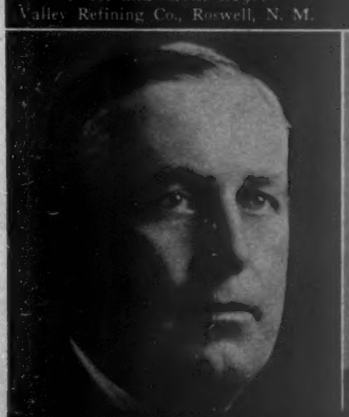
JOE LOUDERMILL, *Supt.*
Louisville Refining Co.
Louisville, Kentucky

S. W. LODEWICK,
Pres. and Gen. Mgr.
Valley Refining Co., Roswell, N. M.

E. V. SMITH,
Member Operating Committee
Idaho Refining Co., Pocatello, Idaho

G. L. FARNSWORTH,
Member Operating Committee
Idaho Refining Co., Pocatello, Idaho

GEO. WALTERSHAUSEN, *Supt.*
Deep Rock Oil Corp.
Cushing, Okla.



J. W. GLASS, *Supt.*
Socony Vacuum Oil Co., Inc.
(White Eagle Div.), Augusta, Kans.

JOHN L. BENTON, *Supt.*
Tri-State Refineries Inc.
Henderson, Ky.

E. R. LEDERER,
Pres. and Gen. Mgr.
Bradford Oil & Refining Co., Bradford, Pa.

MICHAEL J. WELSH, *Mgr.*
The Atlantic Refining Company
Atreco, Texas

ALBERT E. MYERS, *Mgr.*
Shell Oil Co., Inc.
Coalinga, Calif.

J. J. ALLINSON, *V. Pres. and Mgr.*
Lion Oil Refining Co.
El Dorado, Ark.

J. R. COX, *Supt.*
Rodessa Oil Refining Corp.
Shreveport, La.

JOHN S. HERRIN, *Supt.*
Tri State Ref. Inc.
Thermopolis, Wyoming

R. C. ROHRDANZ, *Supt.*
Shelly Refining Co.
Bay City, Texas

A. C. KITTELL, *Pres. & Gen. Mgr.*
The Aerex Company
Bloomfield, N. M.

J. H. HUTCHINSON, *Gen. Supt.*
Cushing Refining & Gasoline Co.
Cushing, Okla.

G. C. McSWAIN, *Supt.*
The Texas Company
Amarillo, Texas

JOHN WARD POOLE,
Assistant Manager
Lion Oil Refining Co., El Dorado, Ark.

E. R. JONES, *Supt.*
Derby Oil Company
Wichita, Kans.

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Member Operating Committee
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Santa Barbara, Calif.

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The Texas Company
Wilmington, Calif.

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Bareco Oil Co.
Wichita, Kans.

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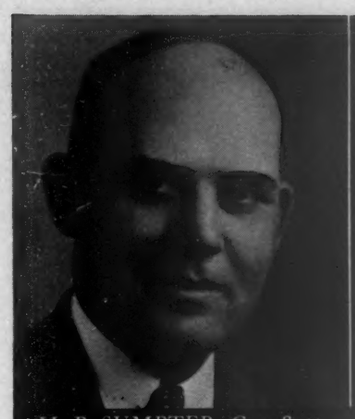
Gilmore Oil Co.
Los Angeles, Calif.

CHAS. W. GLASBY, *Supt.*
Terry Carpenter, Inc.
Scotts Bluff, Nebr.

Refinery Operators

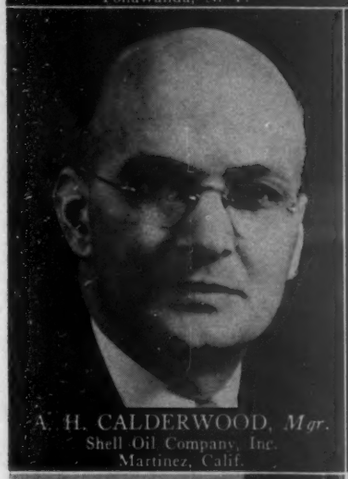


M. P. SUMPTER, *Gen. Supt.*
Frontier Fuel Oil Corp.
Tonawanda, N. Y.

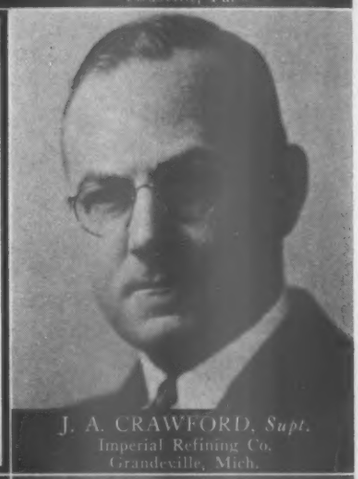
JOHN A. KELLY, *Supt.*
Hiway Refineries, Ltd.
Moose Jaw, Sask. Canada

FRANK J. McGRAW
Oil Creek Refining Co.
Titusville, Pa.

A. C. MOSHER, *Supt.*
Pennsylvania Refining Co.
Titusville, Pa.



A. H. CALDERWOOD, *Mgr.*
Shell Oil Company, Inc.
Martinez, Calif.



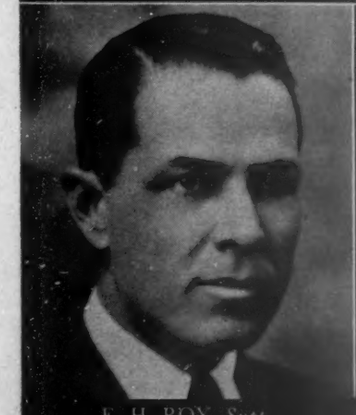
J. A. CRAWFORD, *Supt.*
Imperial Refining Co.
Grandeville, Mich.

CHARLES H. GOSS, *Supt.*
Franklin Creek Refining Corp.
Franklin, Pa.

T. G. MURPHY, *Chief Chem.*
Franklin Creek Refining Corp.
Franklin, Pa.

D. J. HARVEY, *Asst. Ref. Supt.*
The Penzoil Co.
Oil City, Pa.

R. B. ALMENDINGER, *Supt.*
Superior Oil Works
Warren, Pa.



E. H. ROY, *Supt.*
Cities Service Oil Co.
East Chicago, Ind.

DR. E. J. SHAEFFER, *Supt.*
Standard Oil Co. (Ind.)
Whiting, Ind.

P. I. TINKLER, *Supt.*
City Service Oil Co.
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Envoy Petroleum Co.
Long Beach, Calif.

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Kanotex Refining Co.
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Joplin, Mo.

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Allied Oil Corp. of Illinois, St. Elmo
Basin Oil Refining Co., Centralia, Ill

D. F. GERSTENBERGER,
Gen. Mgr., Inland Empire Ref. Inc.,
Mgr. of Mfg. Idaho Refining Co.

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Tulsa, Okla.

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Snow Cap Oil Co.
Sunburst, Mont.

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Centralia, Illinois

H. A. BOOHER, *Supt.*
Cushing Refining & Gasoline Co.
Cushing, Okla.

F. E. VAN BUREN, *Supt.*
Aetna Oil Co.
Louisville, Ky.

CLYDE A. CROMWELL, *Supt.*
Independent Sales Co.
Laurel, Mont.

R. B. PIERCE, *Mgr.*
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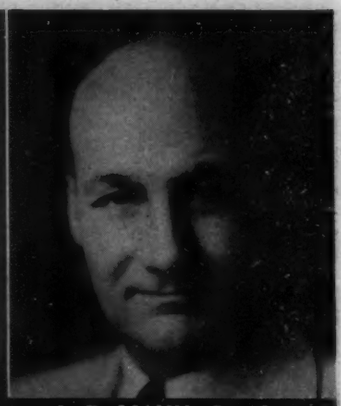
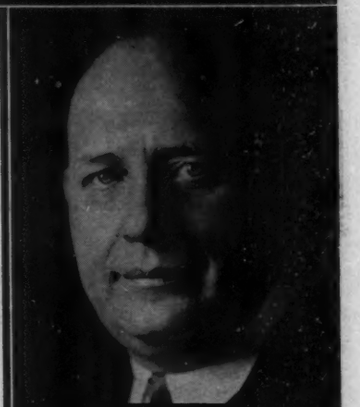
Valley Refining Co.
Roswell, N. M.

FRED G. FELLOWS, *Supt.*
Continental Oil Co.
Ponca City, Okla.



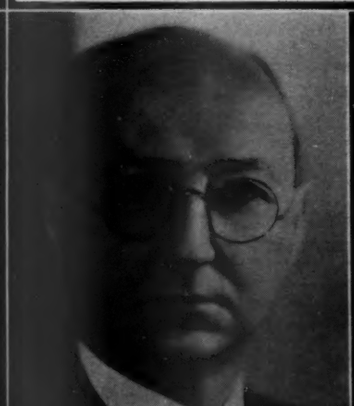
L. D. MANN, *Gen. Supt.*
Cities Service Oil Co.
Bartlesville, Okla.

JOHN F. LYNCH, *Supt.*
Fletcher Oil Co., Inc.
Wilmington, Calif.



HARRY F. GLAIR, *Gen. Mgr.*
Standard Oil Co. (Indiana)
Chicago, Ill.

JOSEPH SLUTZKER, *Mgr.*
Barber Asphalt Corp.
Barber, N. J.



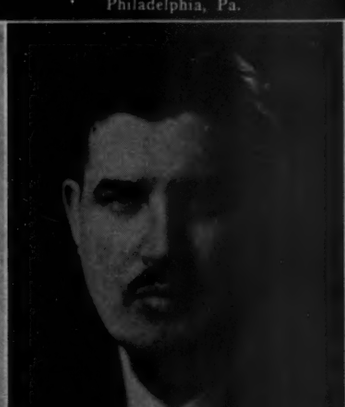
C. L. HENDERSON, *Gen. Mgr.*
Vickers Petroleum Co.
Wichita, Kans.

LESTER M. GOLDSMITH,
Chief Engineer, Atlantic Refining Co.
Philadelphia, Pa.

ROGER Q. TRAWEEK, *Gen. Supt.*
Eastern States Petroleum Co., Inc.
Houston, Texas

H. R. SMITH, *Supt.*
Arkansas Fuel Oil Co.
Shreveport, La.

J. E. FENEX, *Supt.*
Continental Oil Co.
Denver, Colo.



GILBERT D. MOYLE, *Gen. Mgr.*
Idaho Refining Co.
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H. B. OVERTON, *Supt.*
The Globe Oil and Refining Co.
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Black Gold Refining Co.
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E. S. SANDERS, *Supt.*
Standard Oil Co. of Ohio
Toledo, Ohio

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General Superintendent
Standard Oil Co. (N. J.), Baraws, N. J.

A. M. SCHREPFER, *Supt.*
Vickers Petroleum Co.
Potwin, Kans.

W. K. HOLMES, *Supt.*
The Texas Company
West Tulsa, Okla.

C. B. CARTER, *Supt.*
Sun Oil Co.
Yale, Okla.

H. G. OSBORN, *Mgr.*
Continental Oil Co.
Ponca City, Okla.

H. L. McMENEMY, *Supt.*
Maritime Oil Co.
Houston, Texas

G. W. WILBUR, *Asst. Supt.*
Arkansas Fuel Oil Co.
Bossier City, La.

C. L. WEDELL, *Supt.*
Canton Refining Co.
Canton, Ohio

Dr. R. H. WASER, *Mgr.*
Shell Oil Company, Inc.
Houston, Texas

G. C. ANDERSON, *Supt.*
Eldorado Refining Co.
El Dorado, Kans.

F. W. McCURRY,
Vice President and General Supt.
Derby Oil Co., Wichita, Kans.

Refinery Operators

DON J. BAIZE, *Supt.*
Roosevelt Oil Co.
Mt. Pleasant, Mich.

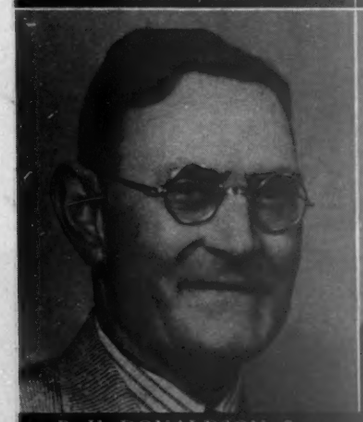
J. K. MacKINNON, *Gen. Mgr.*
Talco Asphalt & Refining Co.
Mount Pleasant, Texas

R. D. WILLIAMS,
Vice President and Gen. Mgr.
Shelby Refining Co., Bay City, Texas

J. H. GRIMES, *V.-Pres. and Supt.*
Socal Oil & Refining Co.
Huntington Beach, Calif.

E. J. MARY, *Supt.*
Globe Oil & Refining Co.
McPherson, Kans.

R. H. MAIN, *Supt.*
Continental Oil Co.
Glenrock, Wyo.



R. H. DONALDSON, *Supt.*
The Texas Company
Shreveport, La.

CARL ORRISON, *Supt.*
Bay Petroleum Corp.
McPherson, Kans.

K. J. SMITH, *Supt.*
Skelly Oil Co.
Eldorado, Kans.

A. G. SCHUESSLER, *Asst. Supt.*
Skelly Oil Co.
Eldorado, Kans.

RALPH L. MONG,
The Russell Producing Co.
Sunbright, Tenn.

STUART A. GIRAUD,
Humble Oil & Refining Co.
Houston, Texas

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Continental Oil Co.
Albuquerque, N. M.

JOHN A. MANN, *Supt.*
Continental Oil Co.
Lewistown, Mont.

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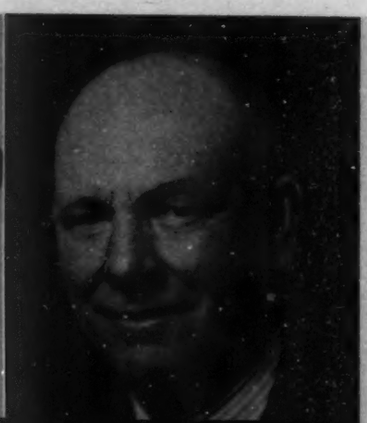
J. D. BROWN,
McColl-Frontenac Oil Co., Ltd.,
Montreal, Quebec, Canada

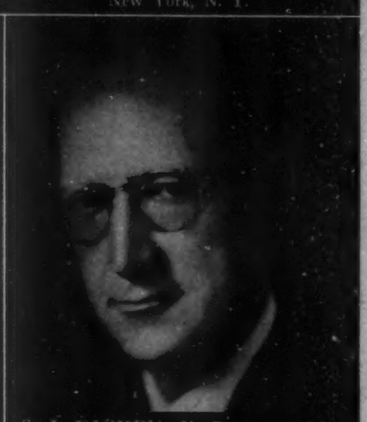
V. C. BURKHARD, *Supt.*
Bradford-Penn Refining Corp.,
Clarendon, Pa.

H. M. WILSON, *Supt.*,
Taylor Refining Co.,
Taylor, Texas



L. M. BOUND, *Gen. Supt.*
Cities Service Oil Co.,
New York, N. Y.

B. J. SKINNER, *Pres., Gen. Mgr.*
Mid-West Refineries, Inc.,
Alma, Mich.



S. J. DICKEY, *V. Pres. and Mgr.*
General Petroleum Corp. of Calif.
Los Angeles, Calif.

J. G. MARSHALL, *Supt.*
Mid-West Refineries, Inc.,
Alma, Mich.

GERALD M. HECHTER, *Supt.*
Radio Oil Refineries, Ltd.,
Winnipeg, Manitoba, Canada

R. G. COLLINS, *Supt.*
The Texas Company,
Dallas, Texas

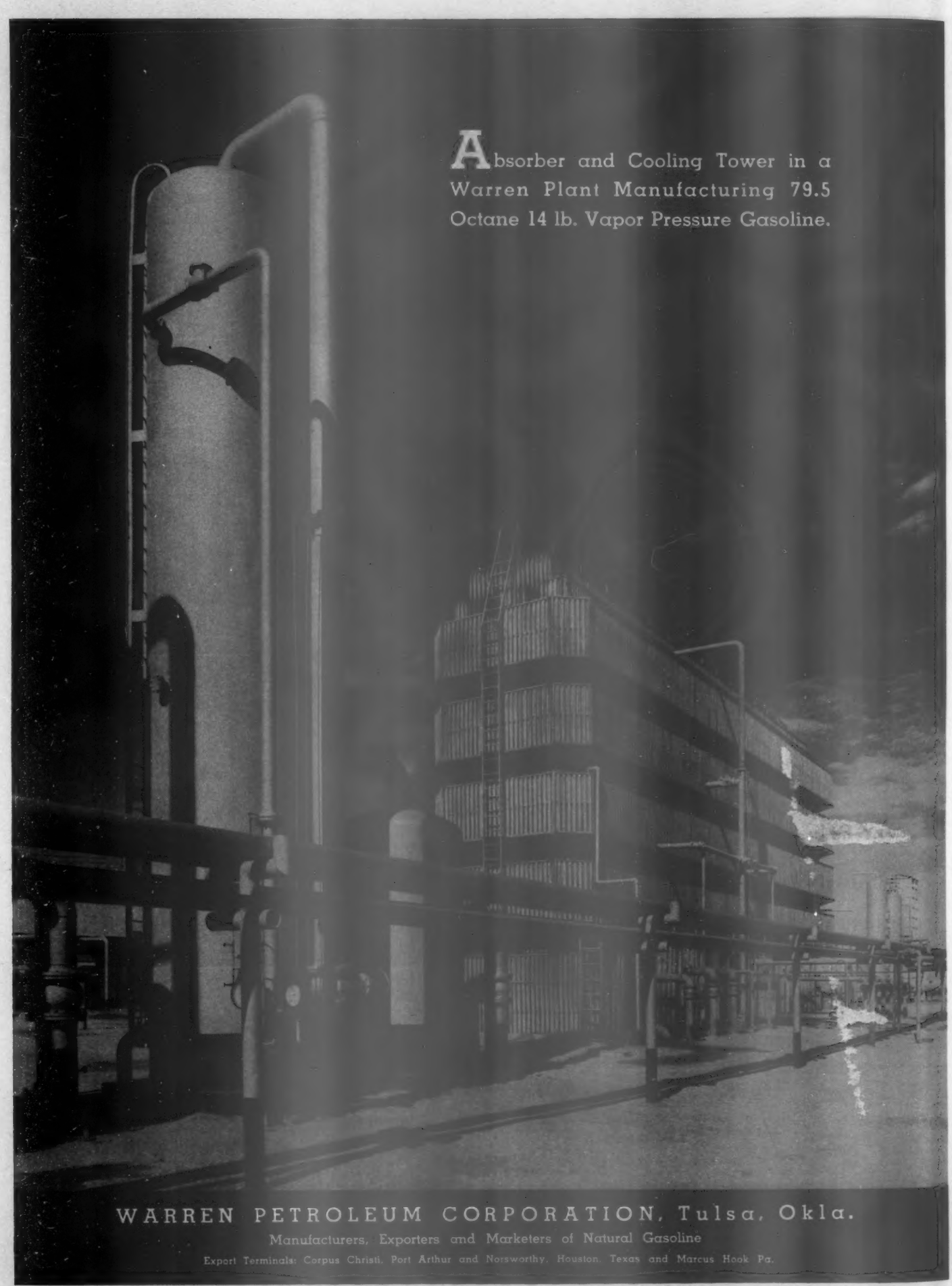
E. E. EBNER, *Gen. Supt.*
Quaker State Oil Refining Corp.,
Emlenton, Pa.

C. B. W. ANDERSON, *Supt.*
McColl-Frontenac Oil Co., Ltd.,
Toronto, Ontario, Canada

W. H. GANNON, *Gen. Supt.*
Naph-Sol Refining Co.,
Muskegon, Mich.

D. Y. HEWITT, *Gen. Mgr.*
Roosevelt Oil Co.,
Mt. Pleasant, Mich.

T. N. REED, *Supt.*
Bayou State Oil Corp.,
Houston, La.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Manufacturers, Exporters and Marketers of Natural Gasoline
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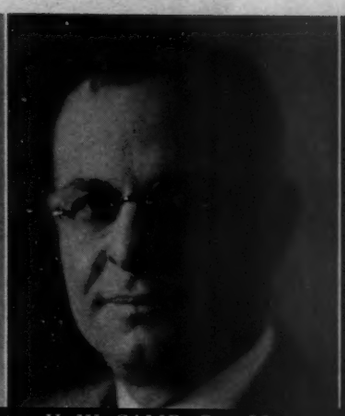
Quaker State Oil Co.
Emlenton, Pa.

P. M. ROBINSON, *Engr.*
The Pennzoil Co.
Oil City, Pa.



H. W. CAMP, *Gen. Mgr.*
Cities Service Oil Co.
Bartlesville, Okla.

J. W. BROWN, *Supt.*
Continental Oil Co.
Baltimore, Md.

I. M. HEMPHILL, *Mgr.*
Shell Oil Co., Inc.
Wilmington and Dominguez
Calif. Refineries

R. R. IRWIN, *Gen. Mgr.*
Socony-Vacuum Oil Co. Inc.
White Eagle Division
Kansas City, Mo.

E. J. HENRY, *V. Pres.*
Atlantic Refining Co.
Philadelphia, Pa.

H. M. NICHOLS, *Mgr.*
Atlantic Refining Co.
Philadelphia, Pa.

N. F. GALLUCCI, *Mgr.*
Exeter Refining Co.
Whittier, Calif.

G. W. HANNEKEN, *V. Pres.*
Standard Oil Co. of Ohio
Cleveland, Ohio

DENVER H. HYLER, *Supt.*
Continental Oil Company
Wichita Falls, Texas

FRED ISAACS, *Mgr.*
General Pet. Corp. of Calif.
Los Angeles, Calif.

C. A. JOHNSON, *Pres.*
Socal Oil & Refining Co.
Los Angeles, Calif.

D. P. STURGES, *Supt.*
Cities Service Oil Co. (Pa.)
East Braintree, Mass.

Exterior of new research laboratory of Standard Oil Co. of California, located on the ground of its Richmond, Calif., refinery

Standard of Calif. Builds New Research Laboratory

IN designing the new research laboratory at the Richmond refinery of the Standard Oil Co. of California, the first requisite was to obtain the greatest possible working area for a given floor space. This required that the laboratory rooms be relatively narrow and long, a type of construction which is difficult to light and ventilate. Since artificial light is always required during some part of the day it was decided to depend upon it entirely. This introduced the problem of removing the heat generated by the number of electric lights necessary to provide 20-foot candle, shadowless illumination. Since the ventilating air would require cooling to absorb this heat and provide an even room temperature, it was decided that the additional benefits from washing the air would justify the additional expense. Temperature regulation is facilitated by the use of few windows, the resulting economy of construction helping in part to offset the expense of the ventilating system.

These were the basic design requirements worked out jointly with the company engineering department. In addition it was desired that the building be pleasing in appearance and modern in all respects. The photographs will show how successfully the company architects and engineers realized the first of these requirements and further reading will indicate that operating efficiency and desirable working conditions have in no way been sacrificed for appearance. Evidences of the desire to provide the best possible working conditions are the provision for lighting, air conditioning and noise deadening and the large locker and washrooms.

The first floor includes a library and reference room, two low-temperature rooms, one operating at 32° F. and the other at 20° F. below zero, a glass blower's room, a locker and shower room, a chemical dispensary, a maintenance and designs office, a glassware washroom and 12 large laboratory rooms. These are constructed in pairs with an office for the laboratory supervisor between each two rooms. Lead-covered work benches line the two boundary partitions between each pair of laboratories and occupy the central portion of each room. Desks are built into both sides of the partition between each pair of laboratories. All utility lines for the benches, such as gas, air, steam, vacuum, electricity and water are concealed behind the wall benches or along the middle section of the central benches. Each laboratory contains a fume cabinet, provisions for sample storage and chemical supplies, and shelves for incoming or outgoing samples. The walls of each pair of laboratories are equipped with fittings that permit setting up a wide variety of either small or large apparatus without marring the wall or making it less serviceable for future installations. With this arrangement it will be possible to install and set up equipment without building special bases or stands.

Second Floor

The second floor of the building contains 30 private and general offices arranged around the outer walls. Typewriter noise is reduced in the general stenographic office by a soundproofed ceiling. The central portion of this floor is occupied by a soundproofed conference room, two electrical and physical laboratories, a photographic laboratory, a spectrochemical laboratory, and the air-conditioning and ventilating system.

The ventilating system draws makeup air from outside the building through a water-spray washer situated on the roof. Washed, tempered air is circulated by three blowers delivering approximately 16,000 cu. ft. per minute to the second story and 29,000 cu. ft. per minute to the laboratories and other first-floor rooms. Air exhausted from the laboratories is not recirculated. Each laboratory is provided with independent control so that room temperatures may be regulated in accordance with the varying amount of heat generated by gas burners and other heat sources which may be in use.

Left: Blower room in new laboratory. All air is filtered and supplied as a result of forced circulation. Right: Room used for chemical research

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BUY PUMPING RESULTS

Let BYRON JACKSON TAKE CARE OF THE DETAILS

addition to the pumps used in the udry Catalytic Process, Sun Oil Com- ny uses Byron Jackson Type HO Double ge Hot Oil Charging Pumps as thermal forming units. These pumps are used for arging 200 g.p.m. of naphtha at a tem- rature of 350 degrees F., against a dis- arge pressure of 1,300 lbs. per sq. in.

After 37,736 hours of operation handling "sour" crude oil, this unretouched photograph of the Inner Case and Rotating Element of a 10-stage Byron Jackson Type HO Pump tells a story readily understood by refinery men.

HOUDRY PLANT PUMPING *PRESENTS INTERESTING PROBLEMS*

THE HOUDRY PROCESS presented an interesting pumping problem involving circulation of the heat transfer agent to the catalytic chests. The heat transfer agent used is a mixture of salts, molten, and at temperatures up to 850 degrees F. These molten salts are circulated to the catalytic chests for proper heat control. Structural requirements indicated the vertical type of pump, with the pump enclosed in a collecting chamber at the temperature of the salts, and the driver external to this chamber. The unit required an extremely long shaft, and the matter of expansion strains was highly important. As pumps are for circulation rather than for operation against high pressures, the heads are very low, but astonishingly large circulating capacities are required.

HOW BYRON JACKSON SOLVED THE HOT SALT CIRCULATION PROBLEM

The moving of this quantity of liquid at low heads, without the complicating factor of high temperature, offered to Byron Jackson Engineers a specification which they had previously solved hundreds of times. Neither did the requirement of pumping liquid at high temperatures present a formidable problem to these engineers with a background of experience in refinery work. However, the combination of handling thousands of gallons per minute of molten salts, at a temperature of 850 degrees F., did present a problem, both hydraulically and mechanically, which was solved by several pumps, of the type pictured at left, now in successful operation. **CONFIDENTIAL CONSULTATION** on Your Refinery Pumping Problems — With a background of almost 70 years in developing centrifugal pumps, Byron Jackson Designing Engineers and Sales Engineers are prepared to solve the problems of the future as they have those of the past. *Operating executives, engineers and consulting engineers engaged in refinery construction and operation, as well as developers of new processes for petroleum refining, are invited to consult freely with Byron Jackson Co. regarding any and all fluid moving problems. Such engineering development work is held in strict confidence, and preliminary conferences can be arranged without expense or obligation on your part.*

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Upper picture shows one of eight Byron Jackson Hot Oil Charging Pumps in service at Atlantic Oil Company's Alreco Refinery, where a total of 32 Byron Jackson Pumps are in operation. Lower picture shows Byron Jackson HYDRO-PRESS Pumps used in the Thermal Cracking Unit at Sun Oil Company's Plant as Naphtha Quench Pumps, discharging 50 g.p.m. at a temperature of 140 degrees F., against a discharge pressure of 900 pounds per square inch. When capacities as low as 15 g.p.m. and heads as high as 6,000 feet are your problem, it will pay you to investigate the HYDROPRESS.

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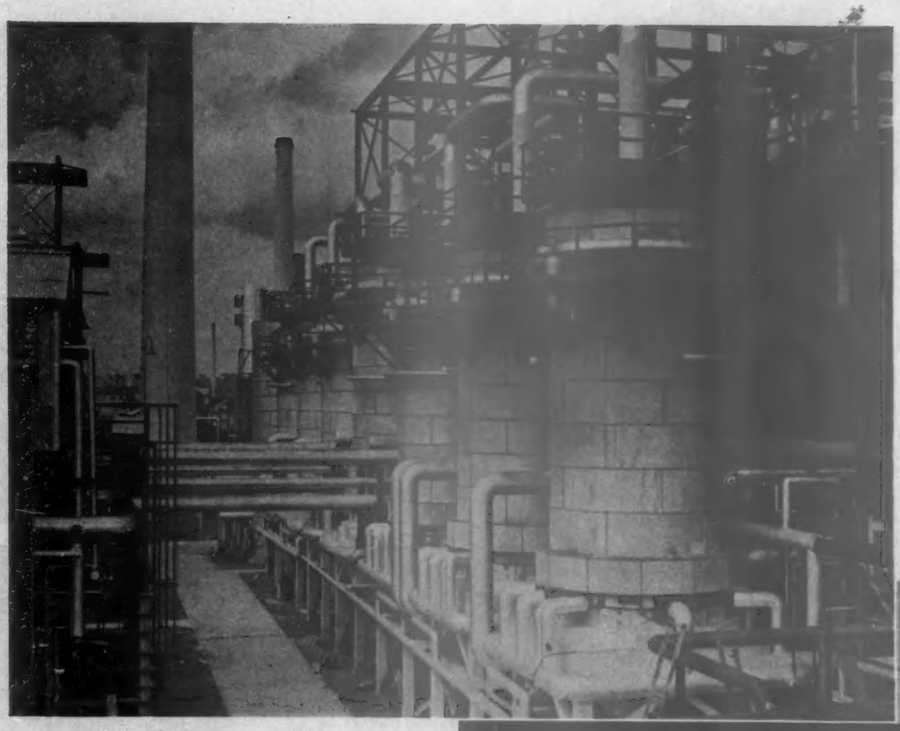
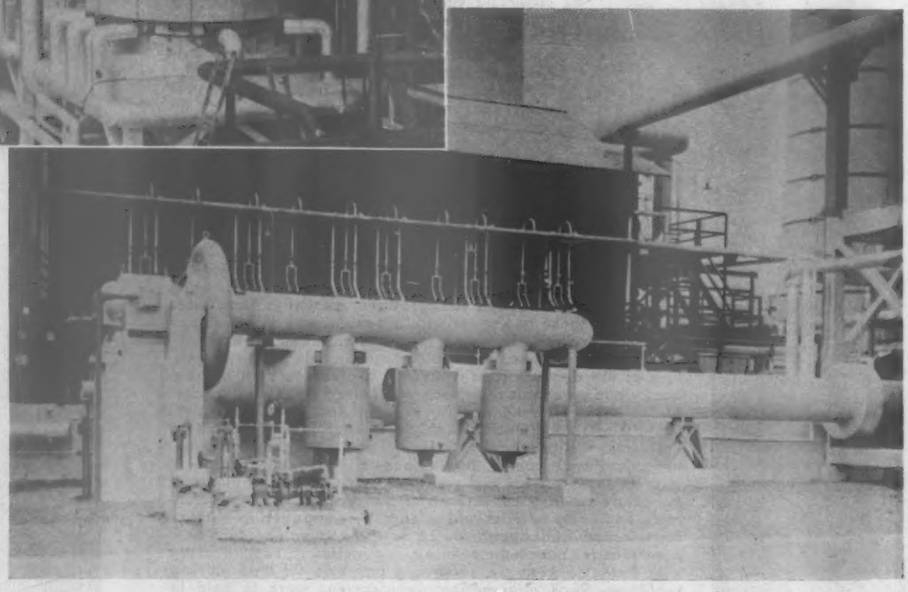
Sun Oil Operating Large H Gasoline Treating Unit a



The name "Houdry" has become known to every refinery operator by way of the catalytic cracking process which bears this name. However, there are other refining processes with which the name is associated.

Here, for the first time, the commercial installation of the 18,000-bbl. Houdry catalytic gasoline-treating plant of the Sun Oil Co. is described as it processes in excess of 18,000 bbl. of raw stock daily in the Marcus Hook, Pa., refinery of that company.

Left: Series of catalytic cases in the Marcus Hook, Pa., cracking plant of the Sun Oil Co. Below: Air blower, heater and filter as parts of the Houdry gasoline treating unit at the plant



By H. STANLEY NORMAN

MARCUS HOOK, Pa.—One of the basic ideas behind all of the Houdry developments as applied to oil refining has been to work the catalyst at its optimum average yield point. It is well known that the catalytic reaction is rapid at initial contact and that it slows down and the yield consequently drops off as the catalyst is "poisoned." The "poison" from the catalytic conversion of petroleum hydrocarbons is mainly heavy hydrocarbons and sulfur.

It is evident, therefore, that for a catalyst of given activity, a relationship curve may be drawn by plotting the yield against time on stream. This would show a maximum yield for the shortest period and zero conversion if sufficient time is given for complete poisoning of the catalyst. A similar plot could be made of time versus rate of catalyst poisoning. This is not a linear relationship although proportionate to the conversion accomplished. Thus, the obtaining of maximum average yields by a reasonable time for the onstream period also means an easier regeneration problem, as fewer actual pounds of poisonous material will have to be removed in order that the activity of the catalyst can be restored.

It will be realized that the commercial success of any catalytic reaction rests upon the ability to regenerate the catalyst and restore its activity. E. J. Houdry, his early associates and the technical staffs of Sun and Socony-Vacuum Oil Co., Inc., have tried thousands of different catalysts during experimental work, but the greatest efforts have been directed toward regeneration because it is the most difficult problem and involves the distribution of the regenerating medium, the control of temperature and the removal and utilization of the heat evolved. The Houdry catalytic cases are, therefore, designed for the best compromise between the requirements for the reaction and regeneration.

Fundamentally these two principles, optimum yield point and thorough regeneration, are behind all Houdry catalytic processes: catalytic cracking, catalytic reforming, catalytic polymerization, catalytic hydrogenation, and catalytic treating.

The Houdry license agreement, which is of the comprehensive type, includes a noncatalytic coking method for the preparation of catalytic cracking stock and for all of the above processes, except hydrogenation.

No particular comment is required on the catalytic-cracking operation. Houdry units are now in operation with a daily catalytic-cracking capacity of more than 150,000 bbl. Three additional plants are under construction which will bring the total capacity above 180,000 bbl. per day. As

Houdry Catalytic at Marcus Hook

reforming can be considered as catalytic cracking, a Houdry reformer of 8,500-bbl. daily capacity, which will be in operation within a few months, should be included in the summary. The reforming installation at Marcus Hook will first use a catalyst developed for the production of aviation gasoline. With another type of catalyst, charging 40-octane East Texas naphtha for instance, a high liquid recovery will result, together with a motor-gasoline yield of the order of 90 per cent and with a C.F.R. motor-method octane of 78-80. Volatility of the reformed product can be controlled. Steps are now being taken for the manufacture of this type of catalyst.

A catalytic polymerization unit has been in operation for more than a year working on butane unsaturates from a vapor-phase thermal unit. A new catalytic cracking unit is now completed in this midwestern refinery and the polymerization unit will work on the Houdry gas, a function for which the poly plant was first installed and originally designed. Two additional polymerization units are now in the process of being designed.

No Houdry catalytic hydrogenation units are in commercial operation as yet. Results from pilot-plant operation, however, indicate that an advance has been made in this art as the nickel catalyst is regenerated to 100 per cent efficiency. Regeneration in the hydrogenation process is made four times per day.

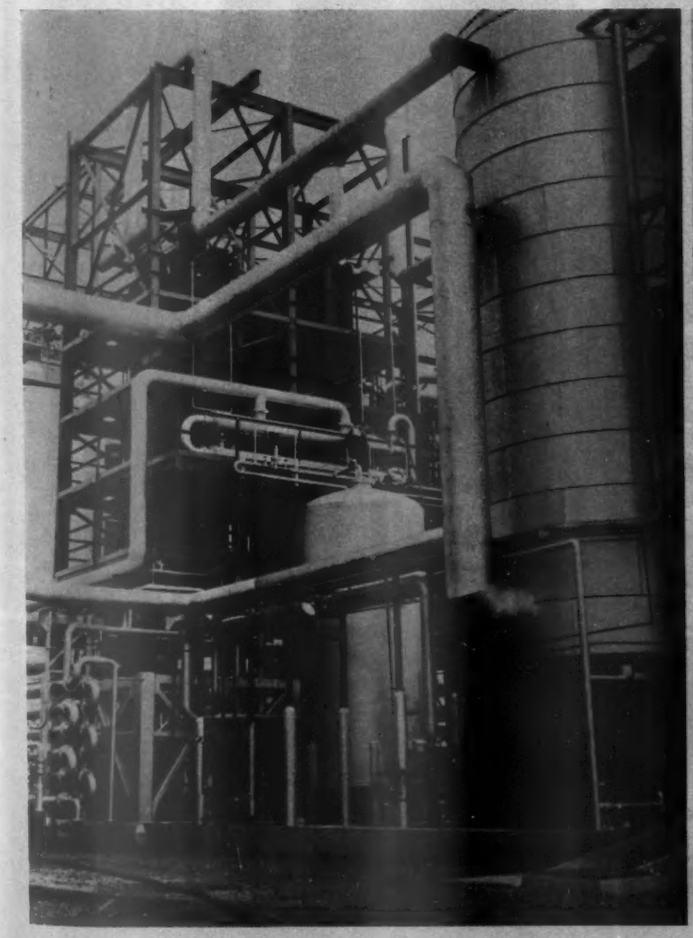
The coking method is noncatalytic. All results indicate that the coke produced is well below that obtained by other methods, thereby giving a higher percentage of recoverable liquid products. This process has been operating continuously in the laboratory and on semiplant scale for more than a year. A commercial unit is under design and expected to be in operation within 4 or 5 months.

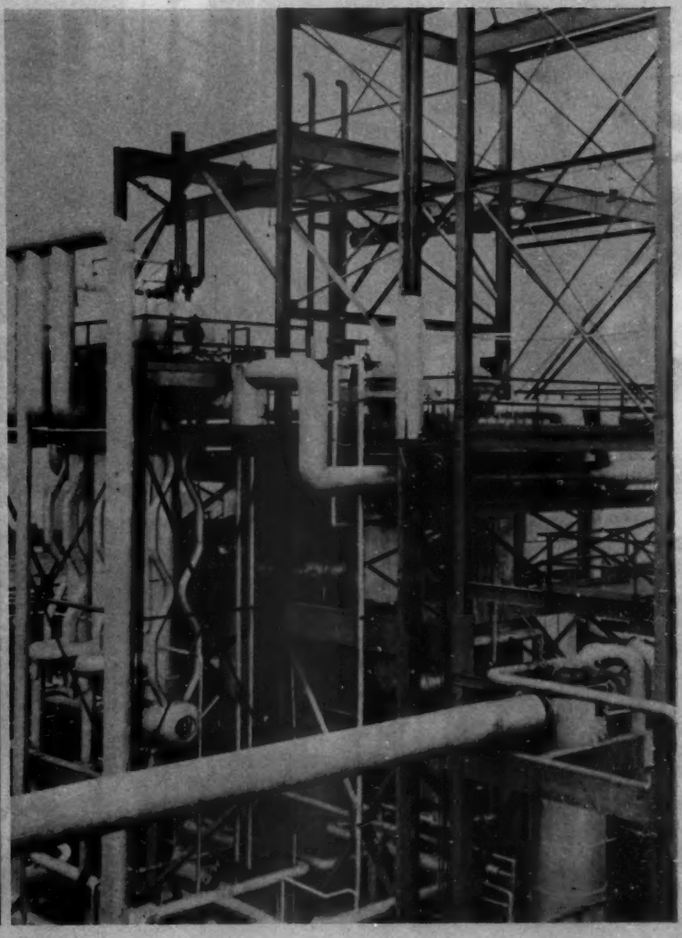
Production of sweet, practically gum-free, low-sulfur-bearing motor fuel from thermal and catalytic cracking plants of Sun Oil Co. at its refinery here is a daily, routine once-through operation in the catalytic gasoline-treating plant.

Removal of mercaptans and hydrogen sulfide which are deposited on the catalyst in the treating cases without loss of octane are the chief accomplishments of the gasoline-treating plant at Marcus Hook, which has a designed capacity of 18,000 bbl. daily. Since its installation, the treater has been more than capable of its rated capacity.

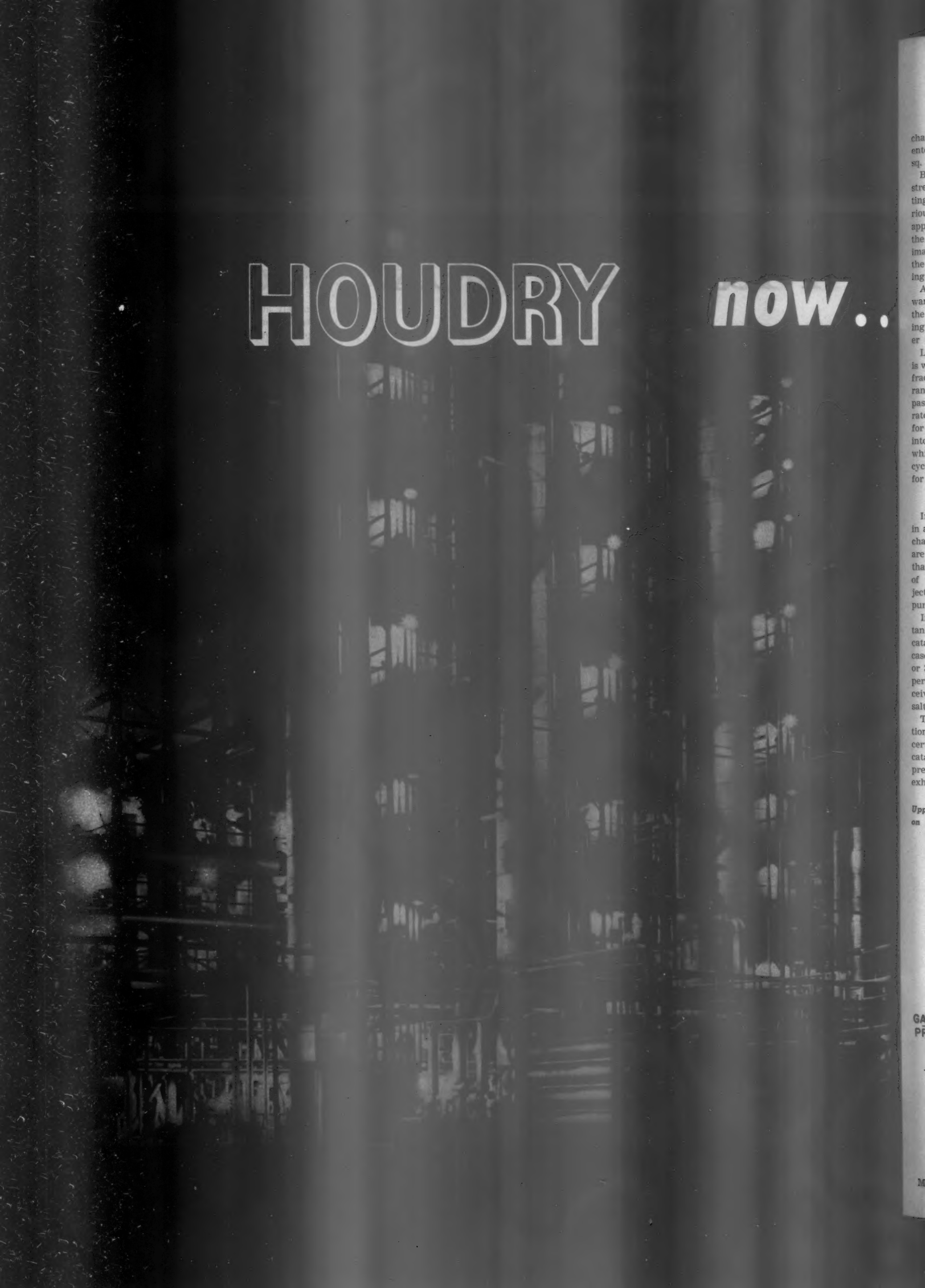
The operating cycle of the catalytic gasoline-treating plant is relatively simple. Charging stock is taken from the cracking-plant storage tanks at approximately atmospheric temperature. The intake stream is pumped through two vertical Leach exchangers where heat is taken from the dis-

(Continued on Page 111)





Shown below are two views of distillation, exchanger and contacting equipment at Marcus Hook. The view at right shows control panel for treating equipment


HOUDRY now..

charge-treated vapors. The charging stock then enters the furnace at about 250° F. at 200 lb. per sq. in. pressure.

Before entering the gas-fired furnace the charge stream is split by a four-way manifold, permitting distribution of the untreated gasoline to various parts of the furnace for even and controlled application of temperature. In passing through the furnace the temperature is elevated to approximately 660° F. and vapors then pass directly to the bottom of either of two treating cases reaching the catalyst at 645° F.

After contact with the catalyst in passing upward through the cases, vapors again pass through the two exchangers, losing heat to the fresh charging stock and then pass into the fractionating tower at 540° F.

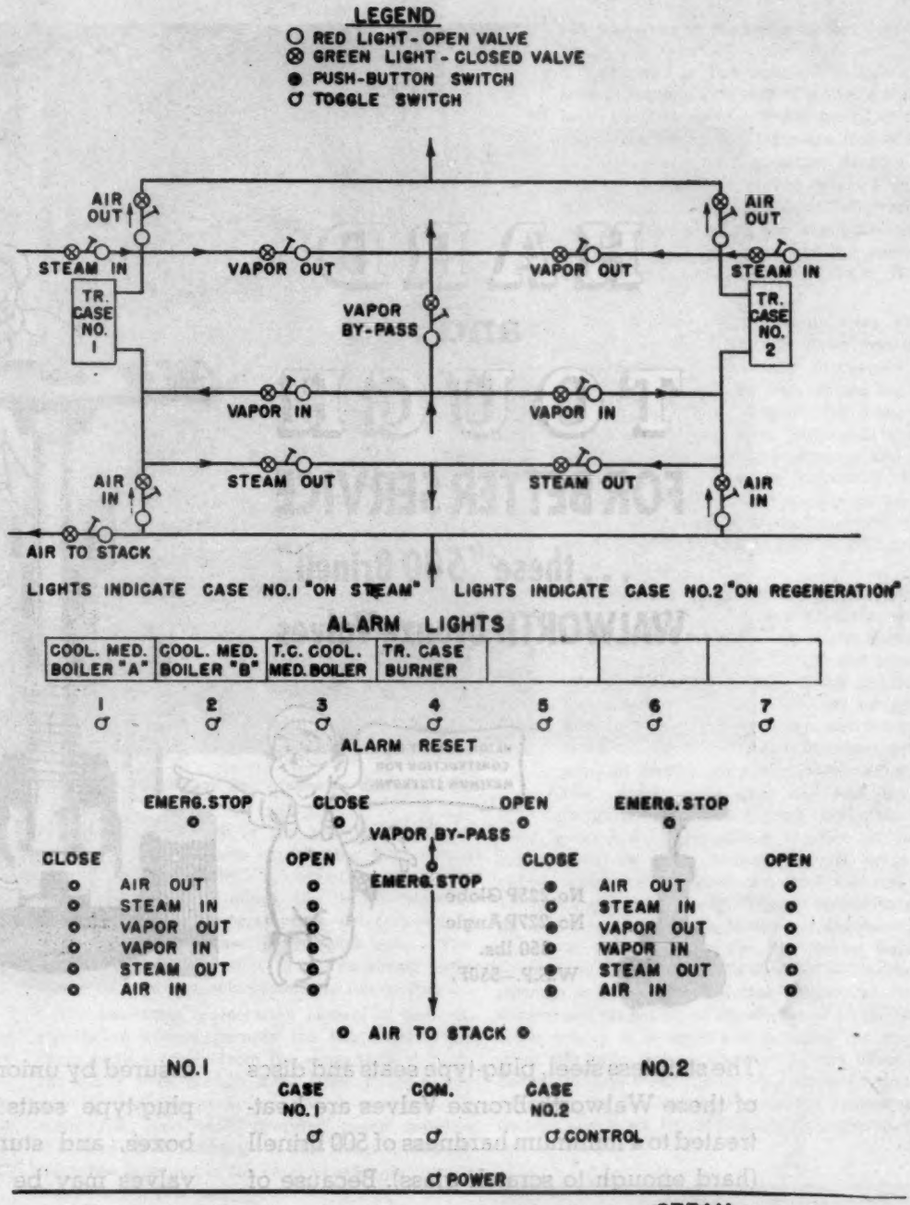
Less than 2 per cent by volume of charging stock is withdrawn from the bottom of the treating-plant fractionating tower as polymer boiling in the range of No. 2 fuel. Remainder of the vapors passes overhead to vertical condensers into a separator and finally into storage where it is available for the stabilization plant and eventual blending into finished motor fuel. The two cases with which the treating plant is equipped operate on cycles of about 3 hours on stream and 3 hours off for regeneration of the catalyst.

Revivifying Catalyst

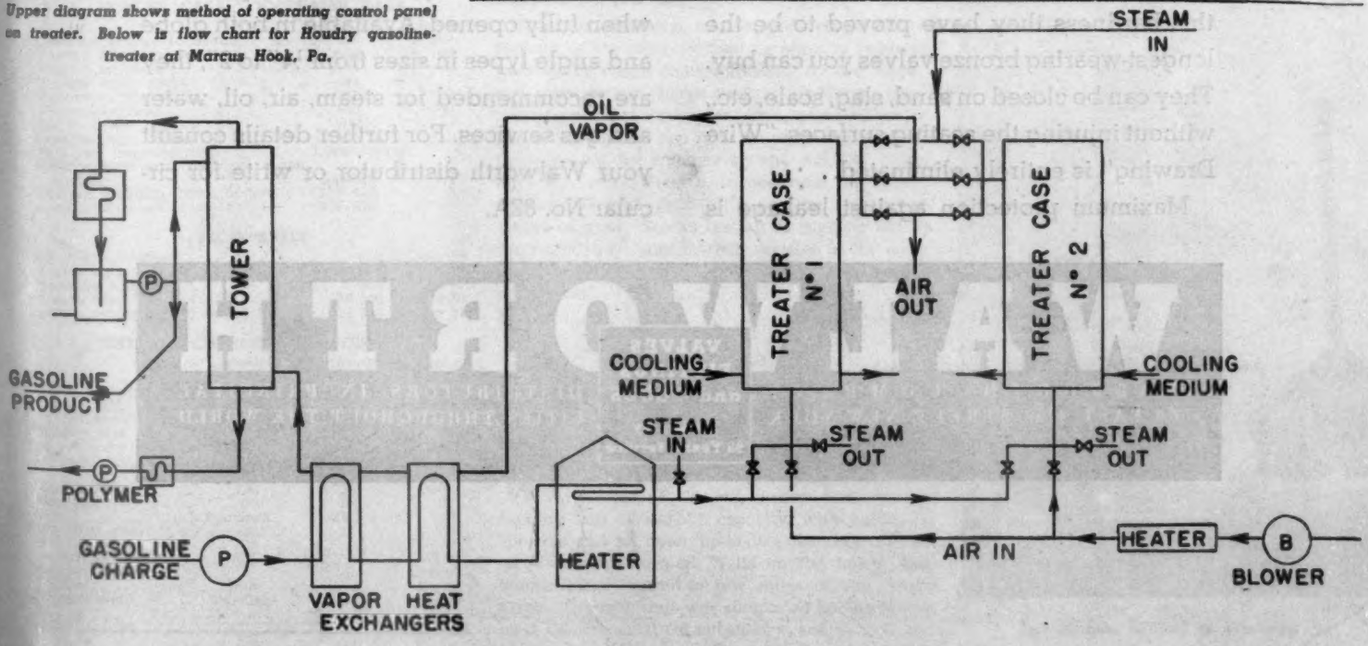
In revivifying the catalyst, filtered air is heated in an oil-fired furnace and blown into the oil-free charge line at a temperature of 700° F. The cases are alternated on the cycle of 3 hours, meaning that one is on stream while the other is in process of regeneration. Before heated air can be injected into the off-stream case, the catalyst is purged of oil vapor by steam.

In the oxidization process of burning mercaptans, sulfur and other carbon deposits from the catalyst by passage of heated air through the mass, case temperature reaches a maximum of 1,000° F., or 355° above operating levels. The catalyst temperature is reduced to the desired range for receiving the incoming gasoline vapors by a molten salt circulating system.

The method of handling the air for regeneration in this catalytic-treating operation differs in certain respects from the system employed in catalytic cracking in that air at relatively low pressure is supplied by a blower and the resulting exhaust gases from the cases are vented directly



Upper diagram shows method of operating control panel on treater. Below is flow chart for Houdry gasoline-treater at Marcus Hook, Pa.



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to a stack. In the catalytic-cracking operations the regeneration pressure employed is considerably higher and therefore the hot gases from the regeneration cycle are returned to a turbocompressor, developed in Switzerland. More than sufficient power is developed to operate the air compressor by expansion of the hot gases through the turbine to atmospheric pressure.

The salt-solution system in the treating plant for catalytic case temperature control absorbs sufficient heat in passing through tubes to generate 150-lb. steam at the rate of 14,700 lb. per hour. Steam required to purge the cases of oil vapors before introduction of air in the regeneration phase of the cycle and other needs of the treating plant total 10,500 lb. per hour, leaving a surplus of 4,200 lb. of 150-lb. steam per hour.

Inject Superheated Steam

Upon emersion from the treater furnace in the vapor stage, a small amount of superheated steam is injected into the transfer line to insure that the charge will remain above its dew point during the period it is exposed to the catalyst.

It is not possible to reveal the exact chemical composition of the catalyst used in the treating plant, but it is simply a variation of that employed in the cracking operation. Basically, the catalyst employed for various functions in the Houdry processes consists of hydrated silicate of alumina. Certain metallic oxides are included in the molded mass for certain types of operation and consist of nickel, cobalt and others.

As in the cracking-plant operation, all control mechanism of the gasoline-treating plant is electrically actuated. Vapor, hot air, discharge, purging and cooling-line valves are actuated by electric motors synchronized to function on the predetermined timing cycle.

Safety is one of the features incorporated in the control system. For example, it is impossible for the vapor-inlet line valve on the catalyst case to open until the regeneration cycle is completed, or at least until the case has been purged of hot air and gases generated in the oxidization phase.

Close up of treater-case No. 2, showing side connections

Each of the two cases constituting the treating plant is represented by a system of green and red lights on the control panel. Bly the illumination of lights the plant operator can determine at a glance just what phase of the cycle exists. The lights burn as each valve in the operating cycle opens and changes color when the line is closed.

The automatic temperature control of the salt-circulation system permits the heat-control medium to flow freely from the sump tank through the boiler, even though some other phase of the regeneration operation may be in progress. A sump-type, electrically operated pump supplies the force for circulating the salt solution through the tubes arranged in the catalyst mass during the regenerating process.

Test data on charge and products reveal the efficiency of the catalytic-treating plant in reducing gum in the virgin charging stock. By the copper-dish gum method charge stock to the Marcus Hook treating plant at a representative operating period tested 35 whereas the product registered 6 and a reduction of one number by the A.S.T.M. procedure was accomplished. In operation the treater appears to have practically no limit in the removal of gum. Stocks testing as high as 200 by the copper-dish gum method register in the order of 5, 6 or 7 upon completion of the cycle through the treater.

HOUDRY CATALYTIC-TREATER DATA

	Temp.	Press.
Gasoline charge to heater	250	200
Vapors from heater	660	60
Vapors to cases	645	50
Vapors from cases	645	
Vapors to towers	540	40
Tower overhead	405	40
Air to cases	700	3
Catalyst (on stream)	645	..
Catalyst (regenerating)	1,000° (max.)	
Cooling medium from case regenerating	400–500	
Cooling medium (from boiler)	370–450	
Cooling medium to cases	400–470	

FLOW RATES

Charge to treater	650 bbl. per hr
Tower bottoms (polymer)	10 bbl. per hr.
Gasoline product	635 bbl. per hr.
Steam used 150 lb./sq. in.	10,500 lb. per hr.
Steam produced 150 lb./sq. in.	14,700 lb. per hr.

TESTS ON CHARGE AND PRODUCTS

	Gasoline charge	Tower bottoms	Gasoline product
A.P.I. gravity	52.6	28.1	53.2
Initial B.P.	94	307	91
5 per cent	130	350	134
10 per cent	159	364	158
50 per cent	298	467	294
90 per cent	390	630	381
End point	423	726	403
Recovery	95	98	95
Color	Too dark	3¼	28
Cu. dish gum	35	..	6
A.S.T.M. gum	2	..	1
Octane C.F.R. M.M.	77.1	..	77.2
Oxygen bomb	..	..	10 hrs.+
Doctor	Sour	..	Sweet
Copper strip	Tarnish	..	Okay

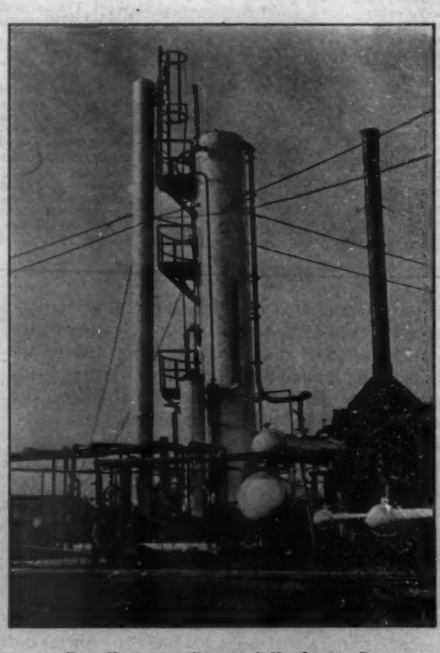
New Automatic Topping Unit In Northwest Canada

WHEN spring comes in the far Northwest Territories of Canada, a new and modern topping unit of 880-bbl. capacity, with automatic controls and all other up-to-date features, will go on stream at Norman Wells on the lower Mackenzie River within a few miles of the Arctic Circle. The new unit was completed by the Northwest Co., Imperial Oil subsidiary, and put on test run just prior to the freeze-up last September.

Operations in this area are unique for several reasons. One reason is that activity is confined to about a 90-day period of the year when rivers and lakes are free of ice and transportation is possible. Another is that the "local" area served covers a territory of some 1,500 miles, from Yellowknife gold-mining district to and along the western Arctic shores, including the radium and silver-mining areas of Great Bear Lake.

The presence of petroleum near Fort Norman on the Mackenzie River was discovered by Sir Alexander Mackenzie in 1789. Geological work was carried out in the area in 1914 by Imperial Oil, Ltd.; in 1919-20 aeroplanes were employed to fly in drillers and drilling equipment and oil was struck at 783 ft. in August of 1920. There are two wells and the production is about 275 bbl. of 39°-40° A.P.I. crude. The crude is an intermediate-base oil with good octane value.

With the development of mining operations in the area, equipment for a small refinery was manufactured at the Calgary refinery plant of Imperial Oil and moved into Fort Norman in 1933. There has been a continuing increase in demand for gasolines and fuel oil in the area and the new plant will permit of supplying these products at greatly reduced prices. Aviation fuel, which until now has had to be freighted in from British Columbia at very heavy cost, necessitating a price of $1 a gallon, will be made available at 37 cents a gallon, exclusive of sales tax, and fuel oil at 13 cents a gallon. Specially designed tanker barges move the fuel oil up the Mackenzie and west on the Great Bear River to the St. Charles Rapids where it is "portaged" for a distance of 8½ miles through a 4-in. pipe line, transshipped to river barges and moved on to the shores of Great Bear Lake, where it is again transshipped for movement 225 miles across the lake to the Eldorado radium-mining area. The oil also moves by tanker barge up the Mackenzie towards the Yellowknife district and down the Mackenzie to points on the Arctic Ocean.



Fort Norman refinery of Northwest Co.

Caustic Washing of Gasoline And Caustic Regeneration

By L. M. HENDERSON, G. W. AYERS, JR., and C. M. RIDGWAY
Pure Oil Co.

CAUSTIC washing of gasoline is of practical interest because it removes[1] certain sulfur compounds. Many sulfur compounds affect adversely the TEL susceptibilities of gasoline and this makes them economically objectionable.[2] Disulfides and free sulfur are particularly objectionable from this point of view. Mercaptans in gasoline impart an undesirable odor. The odor may readily be rectified by the conventional doctor-sweetening procedure but simultaneously this treatment introduces disulfides and free sulfur which are objectionable as noted above. For this reason caustic soda is being used in appreciable amounts for the removal of the lower boiling aliphatic mercaptans with or without subsequent doctor sweetening. Caustic solutions used for the removal of the lower-boiling aliphatic mercaptans may be regenerated[3] for repeated use by simple steam stripping.

Some gasolines, however, contain compounds which react with caustic soda to form products which do not regenerate to form free caustic on steam stripping. Some crude oils and gasolines derived therefrom contain organic compounds that are much more acidic than aliphatic mercaptans. (See Table 1.) In recent work on cracked gasolines from Texas crudes, it was observed that acetic acid as well as many other organic acidic compounds were present having an acid strength approximating that of acetic acid. When caustic soda was used repeatedly on such gasolines the sodium salts of these acids accumulated in the caustic and limited the extent to which the caustic could be regenerated by steam stripping, inasmuch as the salts of the acids in question are not appreciably hydrolyzed in the boiling aqueous solution. Not all crudes or gasolines contain any significant quantities of such acidic bodies, although their prevalence may be more general than is realized.[11] The acidity varies from crude to crude and from product to product, e.g. a Texas crude was examined which possessed an acidity equivalent to 261 lb. NaOH per 1,000 bbl. crude while an Arkansas crude had an acidity equivalent to only 13 lb. NaOH per 1,000 bbl. The uncracked distillation products from the above Texas crude showed increasing acidity with boiling point. Cracking increased the acidity of the total gasoline enormously. (See Table 2.) It would appear that much of the low-boiling organic acids found in the cracked gasoline were formed by decomposition of higher-boiling acidic material in the crude during the cracking operation.

That some of the acids in the cracked gasoline are soluble in water was shown by water washing a gasoline containing cracked and straightrun material obtained from a combination high-pressure cracking unit operating on a mixture of Texas and Arkansas crudes. In this case, 70 per cent of the acidity was removed by water washing. (See Table 3).

While there are certain advantages in applying a preliminary water wash prior to the caustic-mercaptan scrubbing, it is not necessary.

Residual Mercaptans More Acidic

An examination of spent caustic solutions that had been used repeatedly in a refinery on cracked Texas gasoline and repeatedly regenerated, showed that with successive regenerations an increasing fraction of the mercaptans was defying regeneration. It was shown in the laboratory that a specific portion of the mercaptans in the solution could not be removed even with excessively large quantities of steam. This indicated that these residual mercaptans were distinctly more acidic than the low-boiling aliphatic mercaptans. Therefore, certain spent caustic solutions which contained a mercaptan that resisted removal by steam stripping were subjected to steam at various temperatures, dilutions and amounts of steam with little change in the quantity of residual mercaptan. (See Fig. 1). A chemical examination of the regenerated caustic which contained the residual mercaptan not removed by steam revealed the mercaptan to be almost wholly *o*-thiocresol with small amounts of *p*-thiocresol and thiophenol. *o*-Thiocresol is a fairly strong acid, almost as strong as acetic acid.[12] The thiocresols and thiophenols can be titrated quantitatively[14] in alcoholic solution with standard alkali solution using phenolphthalein as indicator, which also shows that they are far more acidic than phenols and aliphatic mercaptans. In view of the acidic strength of the *o*-thiocresol, it is not surprising

(Continued on Page 118)

TABLE 2—ACIDITY OF SEVERAL CRUDE OILS AND PRODUCTS DERIVED THEREFROM

Sample—	Organic acidity (expressed as lb. NaOH required 1,000 bbl. of oil)
Texas crude oil (Sample 1)	261
Texas crude oil (Sample 2)	231
Texas kerosene (Sample 1)	8
Texas kerosene (Sample 2)	14
Texas straightrun gasoline	97
*Texas C.H.P. gasoline (cracked)	254
Texas stabilized absorption gasoline (Sample 1)	139
Texas stabilized absorption gasoline (Sample 2)	166
Texas virgin gas oil	170
Texas reduced crude	452
Arkansas crude oil	13
Arkansas 420 end-point straightrun gasoline	7
Arkansas gas oil	15
Arkansas reduced crude oil	7
Gulf Coast gasoline (Sample 1)	20
Gulf Coast gasoline (Sample 2)	19
East Texas gasoline (Sample 1)	14
East Texas gasoline (Sample 2)	11

*C.H.P. gasoline represents gasoline derived from high-pressure cracking and distillation unit.

The acidities herein reported were determined by A.S.T.M. Procedure D188-27 T for the Neutralization Number of Petroleum Products and Lubricants. For practical purposes the results are here reported in pounds of NaOH per 1,000 bbl. of petroleum products equivalent to the acid present.

TABLE 1—ORGANIC ACIDS FOUND IN PETROLEUM OR PETROLEUM PRODUCTS BY PREVIOUS INVESTIGATORS (EXCLUSIVE OF NAPHTHENIC ACIDS)

Acid—	Source—	Investigator—
Formic	Grosny distillate	Schidkoff[6]
Formic	Signal Hill straightrun gasoline	Hancock and Lochte[5]
Acetic	Signal Hill straightrun gasoline	Hancock and Lochte[5]
Propionic	Signal Hill straightrun gasoline	Hancock and Lochte[5]
n-Butyric	Signal Hill straightrun gasoline	Hancock and Lochte[5]
n-Butyric	Texas distillate	Schutze[6]
Isobutyric	Signal Hill straightrun gasoline	Hancock and Lochte[5]
Isobutyric	West Texas pressure distillate	Williams and Richter[7]
n-Valeric	West Texas pressure distillate	Williams and Richter[7]
n-Valeric	Signal Hill straightrun gasoline	Hancock and Lochte[5]
n-Valeric	Texas distillate	Schutze[6]
Isovaleric	Signal Hill straightrun gasoline	Hancock and Lochte[5]
Isovaleric	West Texas pressure distillate	Williams and Richter[7]
Diethyl propionic	Baku petroleum	Chichibabin[8]
Isocaproic	Rumanian petroleum	Nenitzescu and coworkers[9]
Isoamylacetic	Baku petroleum	Chichibabin[8]
n-Heptylic	West Texas pressure distillate	Williams and Richter[7]
n-Octylic	West Texas pressure distillate	Williams and Richter[7]
n-Nonylic	West Texas pressure distillate	Williams and Richter[7]
Myristic	Ishikari distillate	Tanaka and Kuwata[10]
Palmitic	Ishikari distillate	Tanaka and Kuwata[10]
Stearic	Ishikari distillate	Tanaka and Kuwata[10]
Arachidic	Ishikari distillate	Tanaka and Kuwata[10]
Oxalic	Grosny distillate	Schidkoff[6]
Dimethylmaleic anhydride	Texas distillate	Schutze[6]
Dimethylmaleic anhydride	Signal Hill straightrun gasoline	Hancock and Lochte[5]

TABLE 3—EFFECT OF WATER WASHING ON THE ORGANIC ACIDITY OF TEXAS-ARKANSAS MIXED GASOLINE

Sample—	Initial organic acidity (as lb. NaOH required/1,000 bbl. gasoline)	Volumes used— Gasoline	Volumes used— Water	Per cent organic acid removed
No. 1 First water wash	47.7	300	60	59.0
Second water wash	...	275	55	5.9
Third water wash	...	250	50	5.7
Total by three washes	...	...	..	70.6

TABLE 4—EFFECT OF CAUSTIC WASHING ON THE ORGANIC ACIDITY OF TEXAS-ARKANSAS MIXED GASOLINE

Sample—	Initial organic acidity (as lb. NaOH required/1,000 bbl. gasoline)	Volumes used— Gasoline	Volumes used— Caustic	Strength of caustic (per cent)	Final acidity of gasoline	Per cent organic acid removed
No. 1	47.7	500	100	0.007	4.2	91.2
No. 1	47.7	500	25	0.028	4.2	91.2
No. 2	24.8	800	10	7.000	0	100.0

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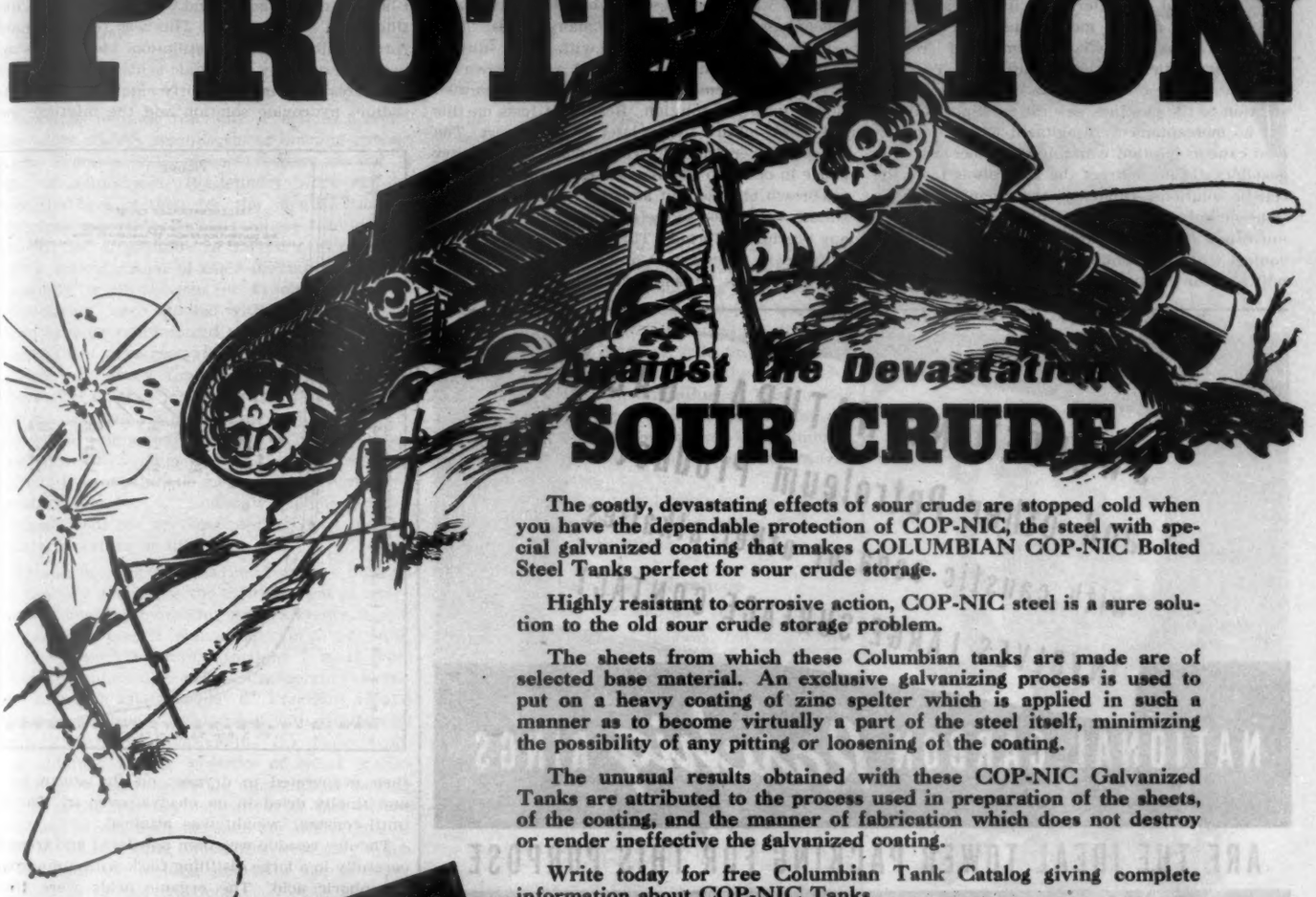

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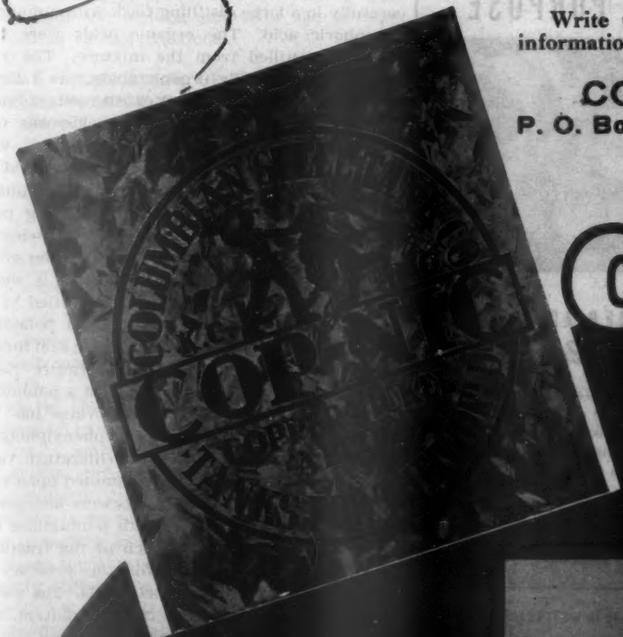

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GALVANIZED BOLTED STEEL TANKS

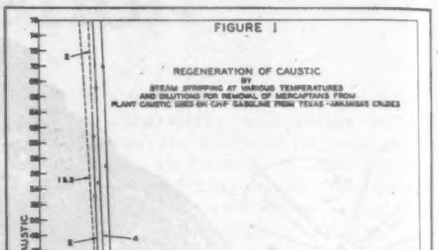
that it could not be readily steamed out of the spent caustic solutions as can the very weakly acidic aliphatic mercaptans.

Except for the fact that thiocresols consume caustic, it was observed that their presence in the caustic did not interfere with the ability of the caustic to remove mercaptans from gasoline, provided an adequate concentration of free or available caustic soda was maintained. To show that the thiocresols do not pass from the caustic solution to the gasoline, several gasolines containing no mercaptans were agitated with a regenerated caustic solution containing *o*-thiocresol. The gasolines did not extract the thiocresols from the caustic solutions. Obviously the regenerated solutions containing thiocresols or other mercaptans must not be allowed to become acid while in contact with the gasoline, for then the mercaptans will go into solution in the gasoline.

A further chemical examination of the acidic components of certain Texas gasolines was made. The acids were extracted from the gasoline by means of aqueous caustic solutions. In order to obtain a sufficient quantity for analysis, a caustic solution was selected which had been used and regenerated in the refinery many times. This caustic solution was acidified with dilute sulfuric acid; 4.5 per cent by volume of a red-brown oil having an extremely disagreeable odor separated slowly from the solution. Results of tests on this red-brown oil are shown later in this report. The aqueous layer was filtered through a wet filter paper in order to remove any fine droplets of the red-brown oil, then an aqueous solution of silver sulfate was added to the clear solution as long as any precipitate formed. This treatment with silver sulfate was necessary in order to remove chloride ion which was known to be present in the solution due to the presence of chlorides in large quantity in the refinery water used in preparing the treating solutions. After filtering off the precipitated silver chloride, the clear solution was distilled to a reasonably small volume, then distilled water was added and the mixture again distilled to a small volume. This was repeated until further dilution and distillation yielded no appreciable quantity of organic acids. The combined distillates were made slightly alkaline with dilute sodium hydroxide solution and the mixture was

FIGURE 1

REGENERATION OF CAUSTIC BY STEAM STRIPPING AT VARIOUS TEMPERATURES AND DILUTIONS FOR REMOVAL OF MERCAPTANS FROM PLANT CAUSTIC USED ON CHF GASOLINE FROM TEXAS - ARKANSAS CRUDES



then evaporated to dryness on the steam bath and finally dried in an electric oven at 105° C. until constant weight was attained.

The dry residue was then powdered and treated carefully in a large distilling flask with anhydrous phosphoric acid. The organic acids were thus carefully distilled from the mixture. The yield of the crude volatile organic acids was 1.25 per cent by volume of the spent caustic soda solution.

The sample of crude organic acids was fractionally distilled into 13 fractions. Tests were made on each fraction to determine what acid (or acids) was present and in each case a suitable derivative was prepared and the melting point determined in order to vertify the presence of the particular acid found. The composition of the sample of crude volatile organic acids is shown in Table 4. The formic acid was identified by its reactions with mercuric chloride and potassium permanganate, respectively. The acetic acid formed a *p*-toluidide melting at 142° C. (literature[15] value 147° C.). The isobutyric acid formed a *p*-toluidide which melted at 104° C. (literature value 105° C.). The isovaleric acid formed a *p*-phenylphenacyl derivative[16] melting at 76-78° C. (literature value 76° C.). Duclaux values[17] were obtained upon each of the 13 fractions and the results were interpreted using the melting points of both *p*-toluidides and *p*-phenylphenacyl esters of each of the fractions. No evidence was obtained for the presence of propionic, *n*-butyric or *n*-valeric acids. The water-soluble acids found in the caustic solution, and therefore present in the cracked gasoline from a Texas crude, were formic, acetic, isobutyric, isovaleric and others of higher molecular weight.

The red-brown oil which was insoluble in the acidified spent caustic soda solution was separated by fractional distillation into 18 fractions. Each fraction gave a positive doctor reaction, indicating the presence of mercaptans and/or thiophenols. Since both the mercaptan content and size of the first five fractions were too small for thorough analysis, no further work was done on the sulfur

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TABLE 5—COMPARISON OF THE EFFECTS OF WATER WASHING AND CAUSTIC TREATMENT ON THE ORGANIC ACIDITY OF TEXAS-ARKANSAS MIXED GASOLINE

(Countercurrent washing in a 14-ft. column)

Treating agent—	Per cent by volume of treating agent based on gasoline	Organic acidity (as lb. NaOH/1,000 bbl. oil) Initial	Final	Per cent organic acids removed
Water	5	16.2	6.2	61.7
Caustic solution (0.088% NaOH)	5	16.2	2.4	85.2

compounds in these fractions. Fractions 6 and 7 had odors slightly reminiscent of burning rubber, while Fractions 8-18 possessed odors similar to that of *o*-thiocresol. Preliminary work showed that the best method for the identification of mercaptans or thiophenols in these fractions involved the preparation of mercury mercaptides and a determination of their melting points; accordingly small portions of Fractions 6 to 18, respectively, were agitated with 10 per cent mercuric cyanide solution and the resulting mercury mercaptides were recrystallized from 80 per cent alcohol. In every case the mercaptide melted above 124° C., thus indicating that thiophenols or thiocresols made up at least the major portion of the sulfur compounds present. (With the exception of methyl mercaptan,[18] all known mercury mercaptides of aliphatic mercaptans have melting points below 120° C., and only the mercaptides derived from the aryl mercaptans have melting points in excess of this value.

Thiophenol was identified in Fraction 6 through its mercury derivative, the melting point of which was not changed by mixture with a known sample of mercury phenyl mercaptide (m.p. 149° C.). By the same procedure, Fractions 7 to 14 were found to contain *o*-thiocresol, the mercury derivative of which melts at 169° C. Fractions 15 and 16 were mixtures of *o*-thiocresol with *p*-thiocresol (m.p. of mercury derivative, 163° C.). No evidence was obtained for the presence of either *m*-thiocresol or benzyl mercaptan, since mixed melting points of the mercury derivatives of each of the fractions mixed with the mercury derivatives of each of the two latter substances were very much lower than the melting points of the mercury derivatives of the fractions.

TABLE 6—COMPOSITION OF THE CRUDE WATER-SOLUBLE VOLATILE ORGANIC ACIDS SEPARATED FROM SPENT CAUSTIC-SODA SOLUTION

(% by Volume)

Acid found—	% of crude organic acids	% of spent caustic soda solution
Formic	Trace (under 1)	Trace (under 0.013)
Acetic	58	0.74
Isobutyric	16	0.20
Isovaleric	6	0.08
Unidentified acids	20	0.25

Results indicated that *o*-thiocresol made up at least 90 per cent of the nonhydrolyzable mercaptan sulfur compounds present in the spent caustic solution.

This is the first time that thiophenol and thiocresols have been isolated from or reported present in petroleum products, although a number of the aliphatic mercaptans have previously been isolated. It is interesting to note that *o*-thiocresol is the principal compound of mercaptan type remaining in the solution after regeneration of these spent caustic soda solutions and that aliphatic mercaptans were present in too small an amount for analysis.

The total mercaptan, thiophenol and thiocresol content of the original sample of spent caustic soda solution is approximately 0.5 per cent by volume, of which a large portion is *o*-thiocresol.

By means of the phthalein reaction,[19] the presence of phenol and/or *o*-cresol was readily shown in Fractions 7 to 15 of the water-insoluble oil and of *m*-cresol in Fractions 13 to 16. By means of mixed melting points of the aroxylacetic acid derivatives, the presence of *o*-cresol was established.

The remaining acidic material in this water-insoluble, red-brown oil, besides thiophenol, thiocresols, phenol and cresols, was found to be mainly naphthenic acids.

Conclusion

It has been shown that the sodium salts of fairly strong organic acids accumulate in the caustic used for the scrubbing of some cracked gasolines. It has been determined that with adequate concentration of free caustic in the solution, the presence of these salts in the solution does not interfere with the use of the solution for the removal of mercaptan sulfur, at least in the concentrations so far examined in this investigation. This assumes, of course, that aliphatic mercaptans have been removed from the caustic by steam stripping.

The authors wish to acknowledge the valuable assistance of Messrs. W. B. Howard, Jr., T. L. McNamara and F. E. Buchan.

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Boiling Points of Heptane and Isooctane Determined

Precise pressure-temperature relationships of certain pure substances are often needed.

By a comparative dynamic method, using water as the reference standard and ebulliometers of the Swietoslawski type, Edgar Reynolds Smith has obtained data from which the following equations have been developed to express the relationship between temperature and vapor pressure from 100 to 1,500 mm.:

For *n*-heptane,

$$\log_{10} p = 6.905113 - \frac{1{,}269.821}{217.110 + t}$$

For 2,2,4-trimethylpentane,

$$\log_{10} p = 6.820137 - \frac{1{,}262.707}{221.307 + t}$$

In these equations, p is the vapor pressure in standard millimeters of mercury exerted by the substance at the temperature t in degrees C.

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REFINERY

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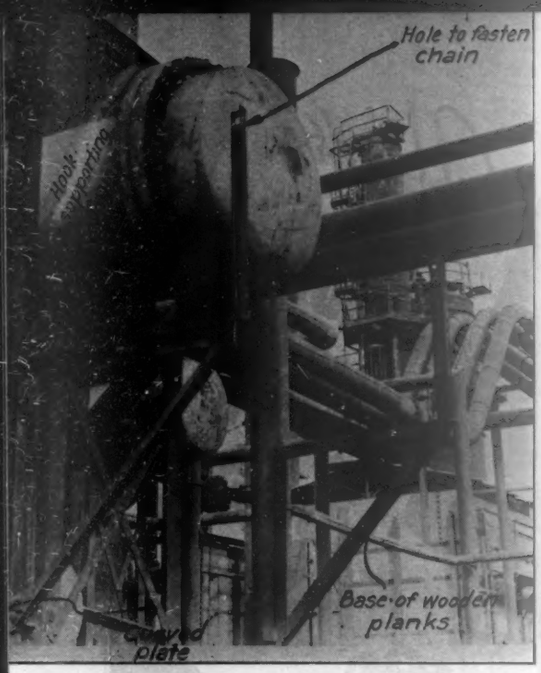


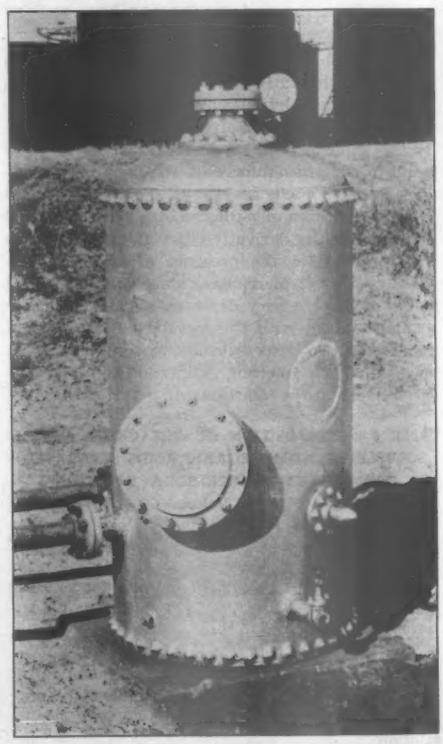
Movable Supports for Quick Repair of Heat Exchangers

Recognizing the need for a safe, movable, light platform on which the operators could stand to inspect or repair heat exchangers, one refiner has developed the triangular supports shown here. Two of these supports with planks laid between, provide the platform. Each support is made up of short lengths of 2-in. angle irons welded into the shape of a triangle with a vertical arm extending from one corner. One side of each triangular support serves as the base for the wooden planks which are laid between two of them. The other side of the triangle is equipped with a protruding hook which is welded to the support near its upper end. At the other end of the support a curved plate is welded to keep the support vertical when in use. The hook extends out sufficiently to fit into a rectangular hole provided at the proper height in each vertical pipe supporting the exchangers. The hook thus allows the triangular frame to be suspended, and the curved plate fits in compression against the same vertical pipe support to keep the support in position. Added safety is provided men working on the platform by stretching a chain between the two arms extending upward from the outer corners of each triangular support. Holes have been drilled through these uprights to accommodate this chain. The chain minimizes the chances of the operator walking backward and off the platform.

Use Remote Controls on Valves Servicing Cracking Still

Three important valves located 20 ft. above the ground level must be adjusted from time to time. This is being done most effectively by use of flexible cables. Located in positions best shown by referring to the picture, these valves are difficult for the operator to adjust. This is especially true if the adjustments should be made at one time. This is possible, however, by revolving the grooved valve wheels which are assembled and supported at a convenient ground level. Positive adjustment is thus provided. In this cracking installation, the valves need adjustment several times during each shift and one operator can do it.

Filter on Kerosene-Loading Line



Storage of kerosene sometimes causes the formation of clouds within the product which lowers its classification and purchase price. In a Texas plant the possibility of storage change is reduced greatly by passing the oil through a clay filter. The filter is in the loading line. To provide greater fire protection, the filter is mounted within a fire wall, and is adequately protected in case of breakage.

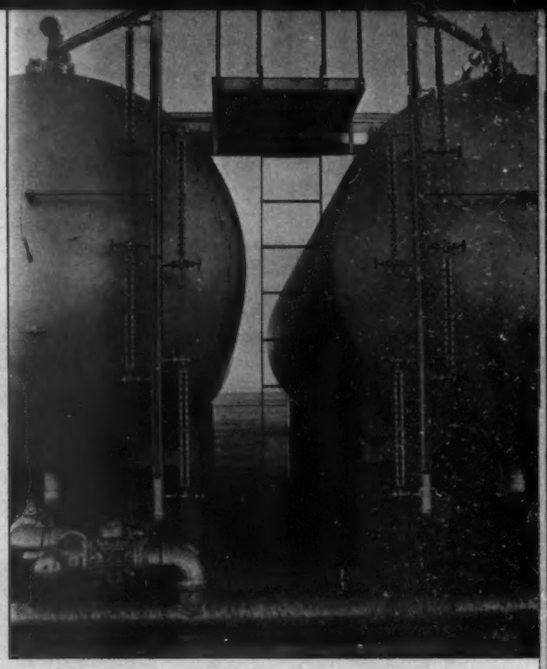
Positive Door Holder Made From Junk Metal

A short length of 2-in. pipe projecting out of the ground at a convenient height serves as a positive door hold at one refinery. The pipe was taken from the junk pile. A rec-

"GADGETS"

Expense, or Do Something Better or More Efficiently

tangular opening 4 in. long and ½-in. wide was burned through opposite sides and ½-in. bolt holes were drilled through the pipe between these openings. A piece of ⅜-in. strap iron about 14 in. long and 2 in. wide was cut with a torch to provide a taper or recess as shown in the picture. A ½-in. hole drilled through the piece near the recess accommodates the bolt and holds the strap iron in position after it is threaded through the rectangular pipe openings. Enough of the strap iron extends away from the bolt on the end opposite the recess to hold the tapered end in an upward position and thus hold the door. The operation of the unit as a door holder is self evident, the door sliding over the taper and depressing it until the door strikes the pipe. As soon as the door presses the taper the weight of the arm raises the taper to hold the door from blowing shut. Raising the weight arm or depressing the taper with one's foot releases the door.

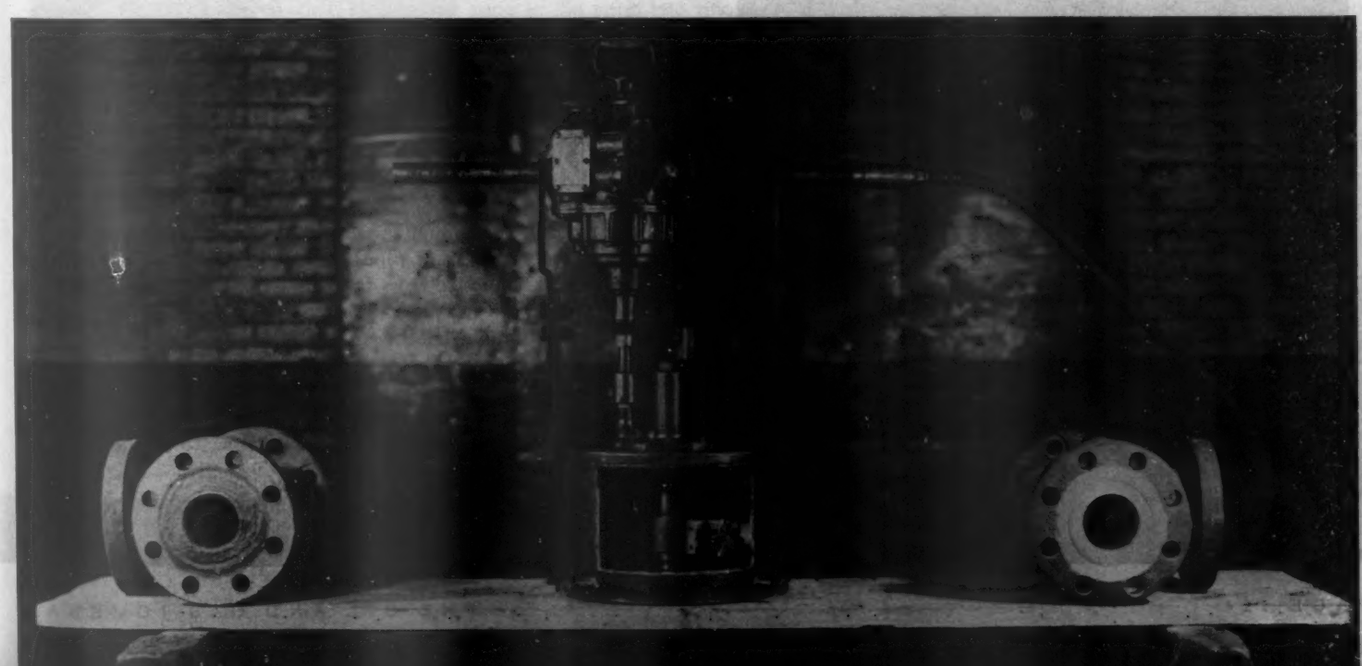


One Ladder Serves Two Run-Down Tanks

By bringing the gage lines from two horizontal and parallel tanks to points forward and to adjacent sides, one ladder may be used to make two gage readings. Note the gage pole mounted on each pipe connecting the top and bottom of each tank. By sighting across the gage can determine the liquid levels on the two tanks from the same ladder.

Portable Flange Facing and Grooving Machine

In an Ohio refinery it was necessary to build up the ring joint of a large number of flanges and fittings because of corrosion having taken away a substantial portion of the metal. Previously, when it was found necessary to build up the facing of ring-joint flanges, they had to be taken to the machine shop and machined out and then the facing filled up with weld metal and a new ring joint machined in the weld metal. This ran into considerable expense and loss of time due to the fact that it was necessary to dismantle the fitting that had to be repaired and take it to the machine shop. The thought occurred that if a portable machine could be clamped on the fitting without removing it from the job considerable time and money could be saved. A portable machine was developed and is driven by an ordinary air motor as shown here. This machine can be used for facing and grooving the flanges on valves, pipe bends, etc., which cannot be taken out of service and put into a lathe. The machine consists of a drum and a spindle which carries the cutting tool and is operated by an air motor driving the spindle. The machine is centered on the flange by four set screws and can face or groove flanges from 3 in. to 6 in. The cutting tool is raised or lowered for depth, or moved across the face of the flange by feed screws. On the left, in the picture, a corroded face is shown. On the right is shown a flange face that has been resurfaced.



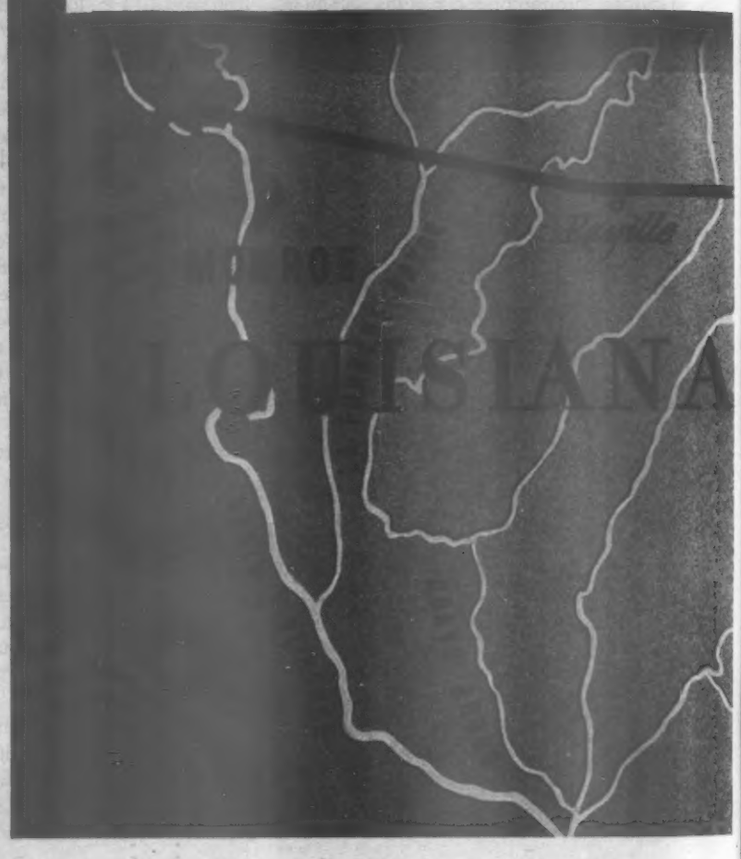
A TRAINLOAD of "Walls Without Welds," enroute to the new United Gas Pipe Line Company project. Delivery schedules were carefully worked out by National engineers, cooperating with executives of the United Gas Pipe Line Company and contractors. Prompt arrival of the pipe on the job was one important factor which aided its speedy completion.

STRINGING THE PIPE. This line was laid in three-joint welded sections, with a coupling between sections. The accurately beveled ends of National Seamless materially help welders and couplers produce dependable joints at a rapid rate. Since this line operates at pressures up to 500 pounds per square inch, sound joints are essential.

THE DOPE GANG is here completing the process of coating the pipe to prevent soil corrosion. The smooth, rolled surface of National Seamless Pipe is well adapted to the application of protective coatings. Bends like the one shown here were made in the field without difficulty, because the pipe is uniformly strong and ductile.

THE COMPLETED LINE, ready for lowering into the ditch. Started early in October, this project was finished early in December, in about nine weeks' time. All along the line, from delivery until the last pipe section was underground, the uniformly high quality of National Seamless Pipe helped speed the job.

175 MORE



New Trunk Line for United Gas Pipe Line Company

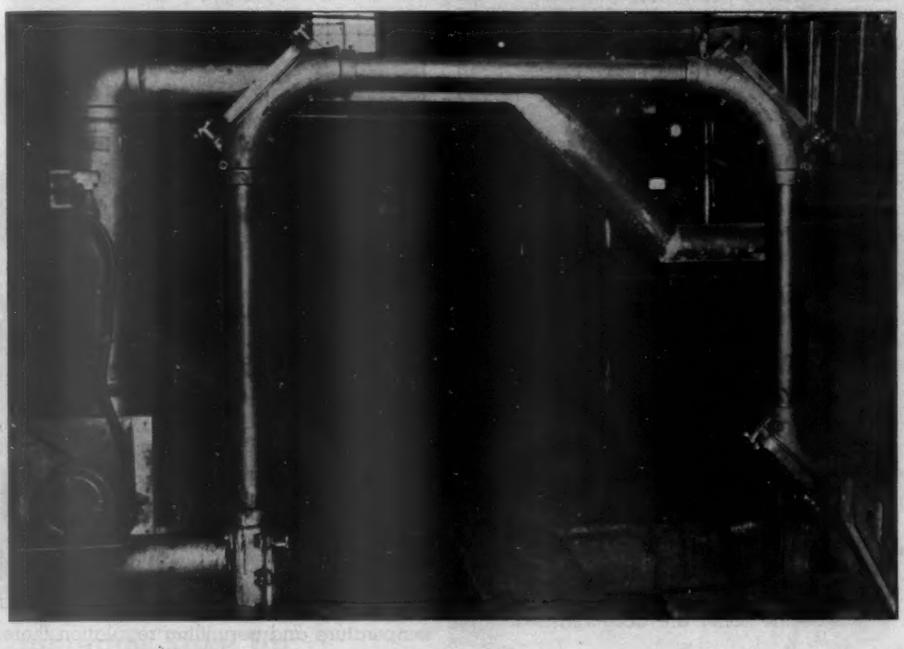
ALL NATIONAL SEAMLESS

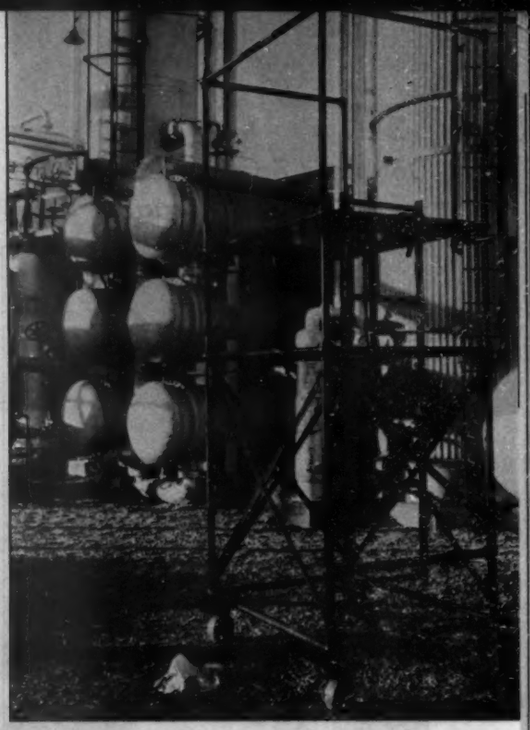
FROM the rich gas fields of Northern Louisiana to the markets of Southern Mississippi, Alabama, Florida, and Louisiana, gas is now flowing through America's newest major pipe line. It is one of the few large-diameter lines to cross the Mississippi River south of St. Louis, and its successful completion proves that even the formidable "Father of Waters" is no bar to gas transmission via pipe line.

The selection of National Seamless Pipe for this entire project, including the 123-mile 18-in. O.D. main trunk line from the vicinity of Monroe, La., to a point

Pneumatic Coal Distributor Improves Boiler Efficiency

This pneumatic coal spreader in the boiler house of a Pennsylvania refinery is saving substantial sums of money for the company. The coal is metered from the hopper by a worm conveyor which crushes the coal to the desired size and delivers it to the transfer section where it is picked up by a stream of high-velocity air and carried to the boiler. Fine particles of coal are burned in suspension and the heavier particles are evenly distributed by an adjustable nozzle to lay down a shallow fuel bed over the grates. Hot air from the furnace is used to dry the coal before it is admitted to the transfer section. Any coal is usable.





REFINERY GADGETS

Heat Exchangers Serviced From Platform on Rollers

Describing the gadget as a "service wagon," a Mid-Continent refiner has developed an adjustable and movable platform for servicing heat exchangers and gas coolers. The frame is electrically welded in the form shown here. The horizontal pipe braces are so placed as to provide the proper height for thet steel platform which rests on these horizontals. This steel base has friction straps welded along its edge so that the floor of the platform can not shift. Obviously, if the upper exchanger is to be serviced the steel floor plate is supported by the upper horizontals and if the middle exchanger of the bank is to be serviced, the floor is lowered to the horizontal supports immediately below. In the same manner, the floor may be lowered to service the lowest of the three exchangers.

Old Tank Rings in Spray Pond Eliminate Mud Problem

Repeated clogging of the suction line which serves a spray pond was eliminated by sinking in the pond two rings of an old 55,000-bbl. tank. Mud which tends to slip from the sides of the pond and move in the direction of the suction line is stopped outside the ring. Perforations in the tank walls keep the level of the water alike inside and outside the ring. The ring also supplies support for a steel walkway which reaches from the bank nearly to the spray nozzles. When repairs to the nozzles are needed it thus becomes relatively easy to erect a floating platform or a suspended platform from the walkway to the nozzle.

Handy Stepladder Made From Junk

A durable stepladder made from scrap pipe and plates was welded together by an operator during odd hours and the ladder has proved to be unusually practicable. It is light enough to be carried by one man but substantial enough to withstand a relatively large weight. It has proved valuable as a means for servicing meters, liquid-level controls and regulators which are used in connection with operation of the cracking unit.

REFINERY GADGETS

Doubling Service From Stack-Guy Anchorage

A joint of extra heavy 10-in. pipe, fitted with a 4-in. cross, is set in concrete to afford elevated anchorage for the stack-guy lines and thus afford ample clearance under them at all points. The top of the pipe is closed with a disk. A similar disk is located lower in the pipe. Holes in these disks accommodate a 2-in. pipe, supported on a boss at the upper end to maintain the desired height in the anchor. A cross arm and strut form a small swivel crane, from which a snatch block may be slung to permit one man to load articles too heavy to be lifted alone. During construction of the refinery, loops, welded to the side of the post, served to hold light pipe sections which were to be bent.

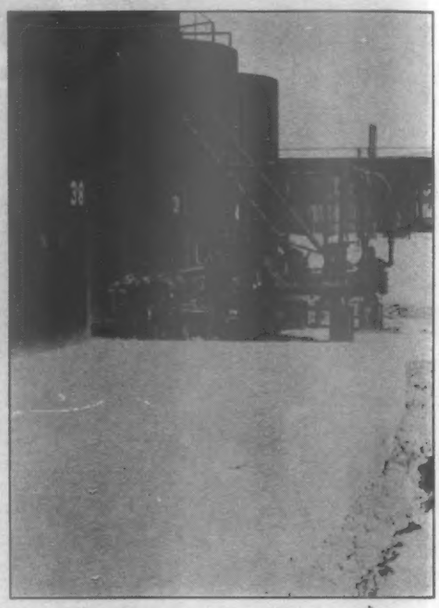
Blow-Down Boiler Conserves Power and Water

In a refinery where full efficiency is demanded of the power-plant steam boilers and where water conditions cause the rapid accumulation of precipitated mud and scale in these boilers, the overall efficiency of the plant has been increased by blowing them down rather frequently and utilizing an old boiler to catch the mud and steam. In this way the mud is concentrated in one place and may be removed from the old boiler most economically and conveniently without placing an extra heavy load on the plant drainage system. The old boiler serves as a condenser also. As the steam and mud are blown into the old boiler three small jets of cold water are sprayed into an enlarged portion of the steam-vent line and the cooling which takes place condenses and conserves

practically all of the original water. The boiler sets in a position to permit the prevailing air currents to pass through its tubes and in this manner cooling and condensation inside the boiler are accomplished.

Cooling Pit Aids Blending Operation

Asphalt hot enough to be handled readily through long, yard lines may be too hot to blend properly with light oils without causing excessive evaporation. Because of this difficulty the pumping of stock to cut-back tanks is usually an attempt to strike a medium between ease of handling and control of vapors. One refinery has installed a large concrete pit, through which coils of pipe permit circulation of the hot asphalt before turning into the cut-back tanks, lowering the

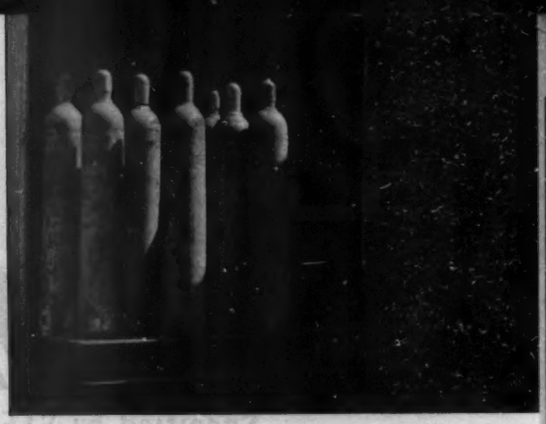


temperature and permitting regulation thereof to insure desired fluidity into the tanks without excess heat to cause trouble there. By means of manifold valves, the length of time a stream of asphalt is cooled may be regulated without the maintenance of a constant temperature of the water in the pit.

"Floating" Drip Pan Promotes Loading-Rack Cleanliness

Vibration of the railroad ties and track as cars are shifted at the loading rack tends to distort or break the drip pan. One refinery uses a welded pan, sloping to its center and welded to a skived 6-in. pipe flexibly connected to the yard sump system. This pan is made strongly enough to withstand all ordinary loading-rack hazards and since it rests on ballast or ties, it may shift without damage. When trackwork is required, disconnecting the drain permits the pan to be lifted clear as a unit, for replacing. Use of pans which are capacious enough to intercept all leakage or drip from acar, reduces fire hazards around loading rack.

REFINERY GADGETS



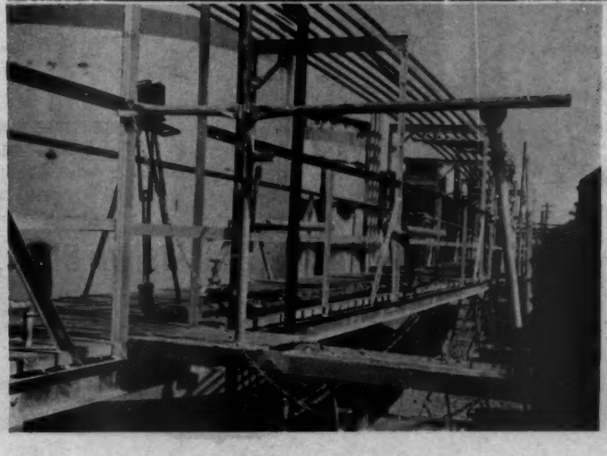
serve both the power and compressor ends of the compression installation. One of the curved and connecting portions of the track is shown here. It is made from a standard I-beam, the rollers for the traveling block resting on lower inside projections of the beam.

Partitioned Platform Keeps Drum Accounts Straight

In order to avoid having empty gas drums scattered throughout the refinery one superintendent has provided a partitioned platform for the storage of all gas drums. The platform is divided by a wire fence and gate. the gate is kept under lock by the storekeeper and he does not open it to let a full drum go through from the inner platform until the empty drum has been placed on the outer platform. In this manner full accounting for the drums and supplies can readily be made and at comparatively insignificant expense.

Maximum Safety Provided by Folding Walkway

At one North Texas refinery a new loading rack was recently completed at which the company devised the folding walkways shown here. The walkways are constructed from lengths of angle iron and floored with 18-in. lengths of 2-in. by 12-in. boards. The walkways are fastened to an extension of the rack about 2 ft. from the end with a counterweight fastened at the lower end. Lengths of 1½-in. pipe are fastened to the platform leading from the rack and to the outer end of the walkway. These are hinged at the three points so that one member forms a handrail when the walkway is lowered, or fold together when it is raised. The pipe is welded to 3-in. disks at the joints so that by keeping the joints well lubricated the walkways are easily raised or lowered. A chain is attached to the outer end for raising the walkway, and a hook provided for holding it in a vertical position. A nipple is welded to the vertical member of the platform to prevent the walkway from being swung in too far and catching a workman's fingers. All parts were fabricated of used material.



Diaphragms Take Up Expansion and Vibration

A battery of water pumps driven by a single steam turbine has been connected to the main outlet line through conventional diaphragm expansion joints. Similar joints have been in use on vapor lines but their use on pump lines has not been common. In this installation, the units make it possible to keep the pumps in more perfect alignment independently of the strain which might have been introduced by the outlet-pipe line elongating or contracting with the seasonal temperature changes of the water.

Circular Track for Crane Used Over Compressors

By erecting a continuous track over the compressors which serve a large refinery gas system it has been possible for one crane to

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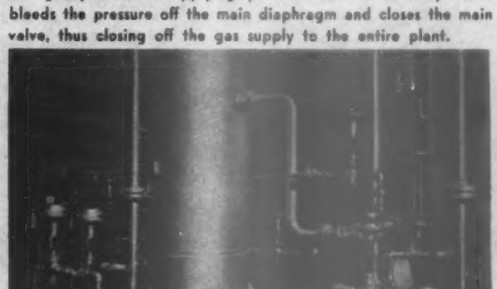
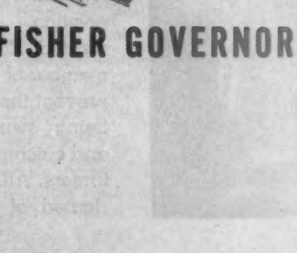
TWO TYPES 4255 RGT WIZARD PRESSURE REGULATORS receiving a varying high pressure from the gas wells and delivering a constant reduced pressure to the plant. Each is equipped with an unloading valve which can be manually pressured from an emergency station. Applying pressure to the auxiliary valve bleeds the pressure off the main diaphragm and closes the main valve, thus closing off the gas supply to the entire plant.



FISHER WIZARD PRESSURE REGULATORS, Diaphragm Motor Valves, and Liquid Level Controllers pictured here are maintaining correct, accurate pressures and levels on recompressor scrubbers and surge tanks.

FISHER TYPE 781 PRESSURE BALANCED REGULATOR shown here supplies reduced gas pressure to the recompressors. The assembly includes three FISHER diaphragm valves which act as shut-down valves operated by high limit level controllers or may be operated manually. By pressuring the diaphragm of the valve in the upper right, the pressure is bled off the diaphragms of the other two diaphragm valves in the fuel line closing the valve at the left and shutting off the gas supply to the engines, and opening the valve at the right venting or exhausting the remaining gas to the atmosphere.



THREE FISHER TYPE 248 LEVEL-TROLS installed on stabilizer, stabilizer reflux accumulator, kerosene accumulator and reclaimed oil accumulator. These wide range liquid level controllers are operating the diaphragm motor valves which are remotely located in the draw-off lines.

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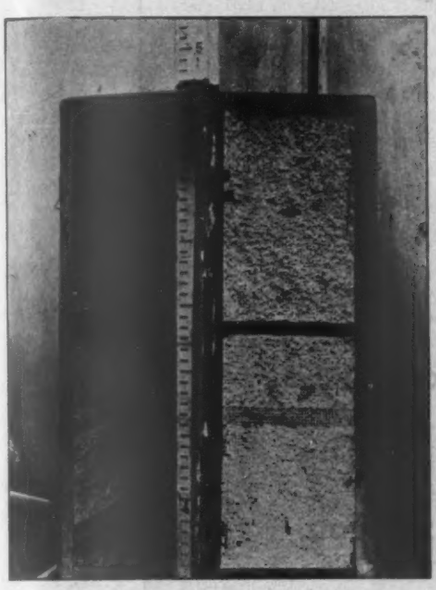
REFINERY GADGETS

Low-Cost Protection Over Gage Glass

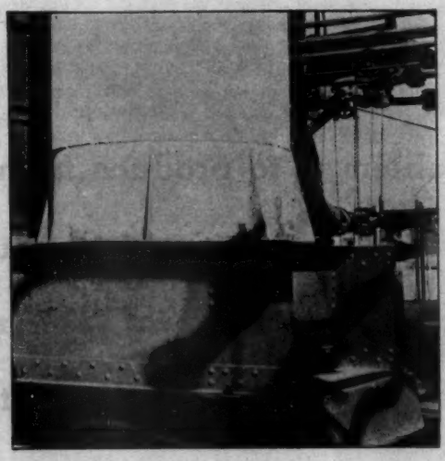
Gaging a closed, horizontal run-down tank in winter was not possible when the water froze in the gage glass. In this particular service, exterior and frequent gaging was necessary and the refiner overcame his winter difficulties by constructing a low-cost protective box over the gage glass and then ran a small steam line through the box. The box frame was constructed in the shape



shown here and a door made of the same material provided access to the gage glass. The unique part of the idea was in utilizing strips of galvanized, heavy-mesh wire to cover the sides, top and door of the box. The sides were fitted closely to the head of the tank so that a back was not needed. Over the screening, the refiner troweled an asbestos paste so that when the paste dried a ½-in. layer of material was securely held by the screen. This material proved effective as insulation, was light and easy to apply.

Support Furnace Stack on Cantilever Beams

Not having sufficient space along the side of a cracking furnace where a solid foundation could be assured for the stack, the refinery engineer has resorted to the use of cantilever



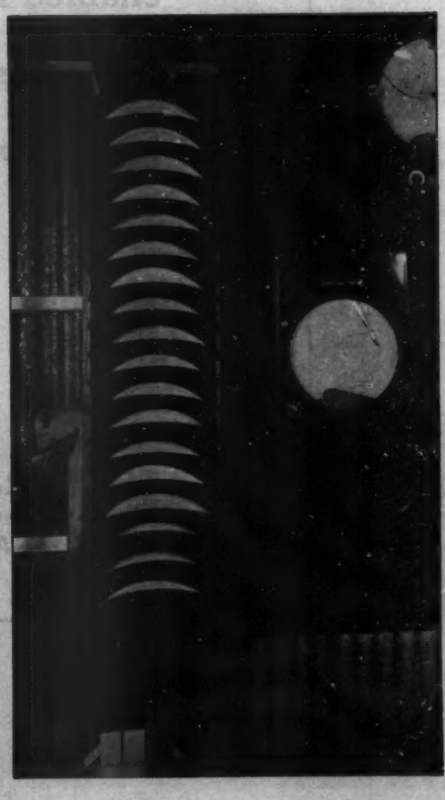
beams for his stack support. Here is shown the extended beams which support the stack. Standard construction practices were employed in its design, the furnace foundation providing the foundation for the stack also. The small concrete slab at the end of the beams offers some support to the stack but its actual effectiveness is relatively small.

File Provided for Charts Taken Off Recording Instruments

Taking the idea from a phonograph-record file, operators in a West Texas plant designed an inexpensive filing cabinet for the daily charts taken from the recording instruments. Each compartment accommodates all the charts from a single instrument over a long period. It is thus an easy matter to trace down the variations in temperatures, pressure, flow, etc., over the period and to do so in relatively short time, due to the convenience of this system. The file consists of 1-in. white pine lumber which forms the back and sides. Slots have been cut into the sides to accommodate the light sheet-iron plates which form the compartments. These plates tilt downward from front to back and are sufficiently stiff to support a full stack of records. The file is kept near the instrument panel and filing is made more convenient.

Open Bins Provided for Construction Materials

Sand, crushed rock, rock dust and other nonperishable supplies used in construction in the refinery can usually be purchased in rail-car lots at substantial savings. They are generally used in small quantities on maintenance jobs and the normal practice is to order them as needed. The refiner may choose to do this to avoid giving ground space for the excess. This refiner has elected to buy his materials in car lots and has provided open wooden bins for their storage. Partitions in the bins are supported by short lengths of creosoted wooden posts to which 2-in. planks are bolted. These partitions extend away from a similarly constructed wall which is about 5 ft. high and runs alongside the railroad tracks. At this height the car can be conveniently unloaded with shovels. As shown here, the partitions taper down and away from the front wall and are spaced far enough apart handle a full car of material at one time.



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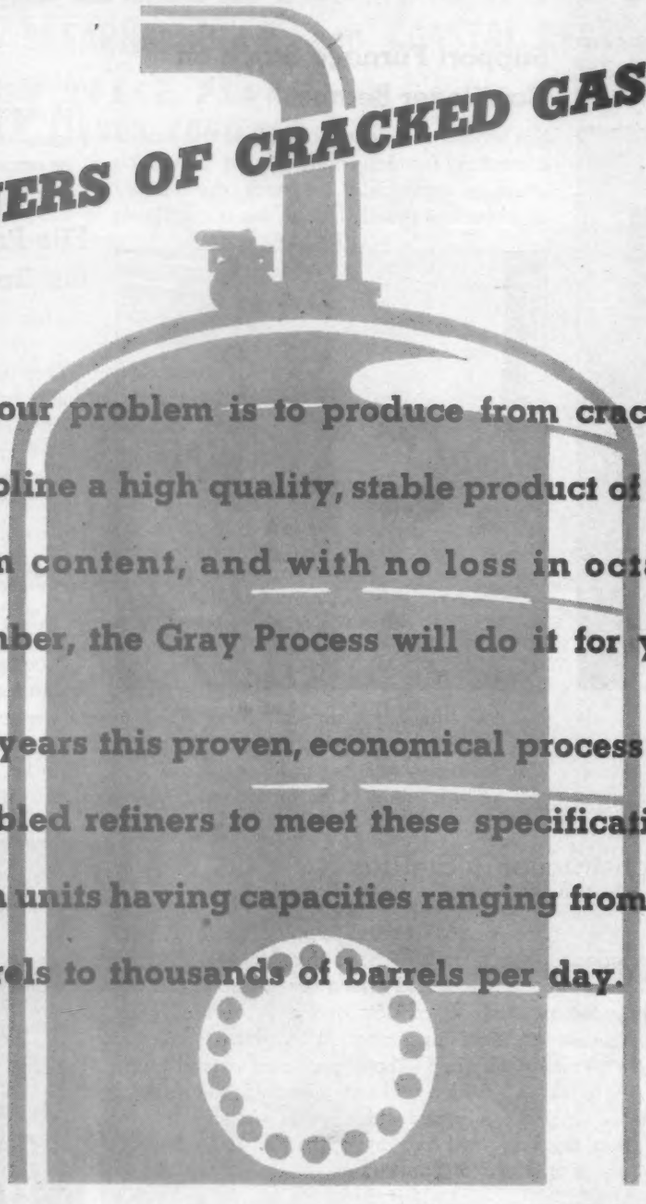

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Causes, Prevention and Control Of Fires - - - on Light Liquid Hydrocarbons

By H. A. HEISS
Standard Oil Co. (Indiana), Whiting, Ind.

YEARS ago refinery fires on such light liquids as propane, butane, and high Reid vapor pressure (30-45 lb.) absorption naphthas were very uncommon. In the early history of petroleum refining the quantity of such stocks handled in refineries proper was relatively small. In addition these products were not normally recovered as liquids but were disposed of as gaseous fuels.

With later improvements in making gasoline it was found to be desirable to recover butanes for use as a liquid blending agent in motor fuels. Accordingly, means of recovering light hydrocarbons came into use as, for example, the recovering of such products from gas streams by absorption in heavy naphthas.

It is significant that during this period of the history of refining these light products, which were in the form of gas or vapors, were handled ordinarily under relatively low pressures, say 0 to 10 lb. per sq. in.

During recent years it has become increasingly imperative to recover such light petroleum products to provide feed stock for such recent processes as polymerization, alkylation, etc. Thus it has become necessary to recover and handle not only butane as liquid but also, in many cases, propane and even lighter hydrocarbons. The handling of such stocks as liquids usually requires the use of high pressures which has increased fire hazards. This is reflected by the increasing number of fires which are occurring on such liquids. A study of recent fires has shown, however, that many could have been prevented had the individuals involved been more familiar with not only the fundamental nature of fire and fire hazards but also with certain physical properties of light liquid hydrocarbons. It was also revealed that the loss from such fires could have been reduced had the limitations of the several methods of fighting such fires been more thoroughly understood and if certain measures for fire protection had been employed.

In order to minimize the possibility of future fires on such products, which might result in not only property damage but also, and more important, personal injury to employes, the Standard Oil Co. (Indiana) developed a program to study methods of reducing such hazards. This program included (1) familiarizing employes with the fundamental physical properties of light liquid petroleum products, with particular regard to the interrelation of the properties and the nature of fire and fire hazards, (2) study and experimentation to determine not only the most effective means of extinguishing fires on light volatile hydrocarbon liquids, but also the equipment changes necessary to eliminate fire hazards.

Fig. 1—Demonstrating the volatility of butane liquid

Educational Program

In order that those who are directly connected with the handling of propane, butane and high Reid vapor pressure (30 to 45 lb.) absorption naphtha and casing-head would become more aware of the hazards involved with such products, a demonstration lecture was developed. This lecture was presented to those individuals whose work involved handling light-liquid materials. The lecture attendance was limited to a maximum of 20 persons so that the problems of each operator could be given individual attention and be discussed in detail.

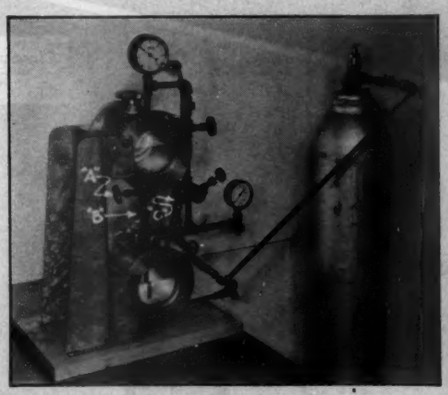

Fig. 2—Butane-blending demonstration apparatus

The lecture was divided into two parts. The first part discussed the nature of fire and fire hazards and was patterned closely after the first part of a lecture developed by J. T. Howell, of the Union Oil Co., and which was discussed in his paper in The Oil and Gas Journal of December 23, 1937. The second part was given to the demonstration and discussion of the properties of butane and similar products.

The Nature of Fire

Similar to the methods used by Mr. Howell, it was pointed out that in order to have any fire on petroleum products it is necessary to have three elements present, namely, vaporous fuel, air and heat. The fact that these three elements are necessary was proved by the several demonstrations discussed in his article. It was stressed that whenever all three of these elements are present at the same time a fire will inevitably occur, but with only two present a fire on petroleum products would never occur. Specific examples were mentioned where two of the three elements normally existed without the third. It was stressed also that heat does not necessarily have to be in the form of a spark or a flame but that in some cases the heat may be contained in the vaporous fuel itself. Examples of fires arising from such sources of heat were outlined, e.g., the flash which would occur if a hot-oil line should leak, causing hot vapors to come in contact with air.

Properties of Light Liquid Hydrocarbons

In the second part of the demonstration lecture, various properties of light liquid hydrocarbons such as propane, butane, absorption naphtha, and casing-head gasoline were discussed and connected with the fundamentals of fire. It was pointed out that such light liquids are hazardous because at ordinary temperatures they are capable of forming, in large quantities, the first element for a fire, i.e., vaporous fuel. It was then demonstrated that butane, in a small beaker, would boil vigorously just from the heat of the hand (Fig. 1). Obviously, several additional means of demonstrating the volatility of such liquids are possible.

It was stated that many fires are prevented on light liquids because they are stored in such a manner as to prevent their vapors from coming in contact with air. In one method butane may be stored under pressure so that no boiling takes place; thus the volume of vapors given off is reduced, and air is excluded. In another method, light liquids are stored in gas-tight tanks equipped

Fig. 3—(Left) Apparatus to compare the weights of butane vapors and air

Fig. 4—(Below) Glass-enclosed turbine

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Close-up of two Pyromaster Indicating Recorders in turbine room.

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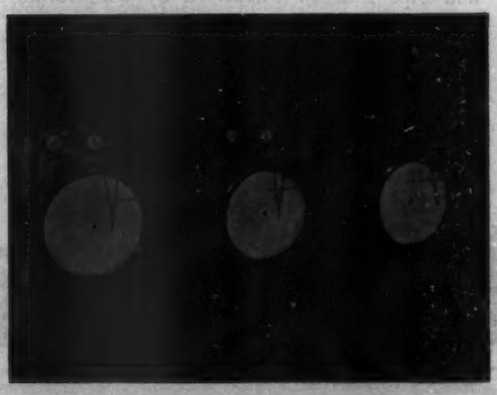
Rear view of three EXPLOSION-RESISTING Pyromasters, installed in the gas plant.



From left to right, — (a) Pyromaster Resistance Thermometer, (b) Pyromaster Temperature Recorder Controller, and (c) Pyromaster Recording Thermometer, installed in gas plant.

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with gas-recovery systems. In this latter case the liquid is stored under atmospheric pressure but at low temperature (caused by the boiling of the liquid) and the vapors evolved are removed and recovered. Here again the vapors are maintained substantially air free.

Although many precautions are taken in the storing of such materials, it is conceivable that the vapors could become mixed with air, as, for example, in improper blending methods where liquid butane would be discharged directly into gasoline-base stock contained in a vented tank. Such a procedure would be accompanied by vigorous evolution of butane vapors. This was compared with a method of blending in which a light liquid is mixed with a heavier liquid under pressure, as in the discharge manifold of butane and gasoline pumps. The blend, after becoming mixed, is then discharged into a vented storage tank. This type of blending, providing the ratio of butane to gasoline is not too great, is accompanied by no boiling and very little vaporization.

A demonstration of the two methods of blending was carried out in the apparatus shown in Fig. 2. Butane, which was colored with ordinary gasoline dye, was placed in the upper chamber and was allowed to come to equilibrium pressure at the room temperature (about 25-35 lb. per sq. in.). Gasoline-base stock (about 3-4 lb. Reid vapor pressure) was placed in the lower chamber which was vented to the atmosphere. It was pointed out that the butane under pressure in the upper chamber was comparable to butane being pumped under pressure in a pipe line while the gasoline-base stock in the vented lower chamber was analogous to the same stock contained in a tank at atmospheric pressure. Valve *A* in line *B* was then opened slightly and a small amount of butane was allowed to discharge into the gasoline-base stock. The vigorous boiling which occurred demonstrated effectively the boiling which would take place under actual conditions. In many cases it was possible to actually see the vapors passing from the vent of the bottom chamber, clearly exhibiting the hazards involved in such blending procedures. In demonstrating the second method of blending light with heavy liquids, the lower chamber was closed and the gasoline was placed under pressure by means of carbon dioxide gas. The pressure in the two chambers was equalized by opening the vent line. The two liquids under pressure were compared with gasoline-base stock and butane under pressure in a pipe line. Valve *A* in line *B* was again opened allowing butane to flow into the liquid below. This, of course, was accompanied by no boiling or gassing. Valve *C* was then opened in order to allow any butane in line *B* to run into the gasoline-base stock (without such venting, subsequent release of the pressure would cause boiling of the butane retained in that line). That liquid butane is lighter than gasoline-base stock was clearly evident by the red layer on top the heavier liquid. Commingling the two liquids in this manner was compared with what occurs in a pipe line when such liquids are joined under pressure; the lack of boiling was notable. It was pointed out at this juncture that if the pressure were released on the lower cylinder the layer of butane on the gasoline would immediately start to boil. In other words, before the heavier-base stock may effectively lower the tendency of the butance to boil (lower its volatility) it is necessary that they be thoroughly mixed. Such mixing occurs in the line which carries the blend to the storage tank. Mixing of the contents of the lower container was accomplished by rocking the apparatus a few times. Finally, to complete the demonstration, the pressure was released on the lower chamber to simulate the discharge of a butane-gasoline blend into a tank under atmospheric pressure. This procedure was accompanied by substantially no boiling or gassing and was effective in demonstrating the advantages of blending under pressure.

The apparatus in Fig. 2, besides the necessary ¼-in. pipe fittings, comprised two 5-in. diameter by 5-in. long steel cylinders, the ends of which were fitted with ⅜-in. Lucite plates. The chambers had a capacity of about 1 l. each.

The boiling and gassing which occurs as a result of improper blending methods constitutes a definite fire hazard in that large volumes of vapor may become mixed with air. It was pointed out that such vapors, on a quiet day, would flow over and down the side of the tank, flow along the ground and possibly come in contact with a source of heat. In such a case the three elements for a fire would be present, i.e., vaporous fuel, air, and heat. A flash would occur which might travel back to the tank and possibly cause a serious fire. The vapors settle to the ground because they are heavier than air. This is a very important consideration since the vapors from practically all petroleum products are heavier than air.

The fact that petroleum vapors are heavier than air was demonstrated by two methods. An apparatus (Fig. 3) consisting of two 4-ft.-long glass cylinders, each open at the top but interconnected by a tube at the bottom, was used in one demonstration. The left cylinder was filled with butane vapor while the right cylinder was filled with air. Because it is heavier than air, the butane vapor passed through the interconnecting tube and flowed into the right cylinder forcing the air out through a glass-enclosed turbine (Fig. 4), causing it to rotate. The movement of the wheel indicated that the butane was flowing from the left to the right-hand cylinder.

This property of petroleum vapors was further demonstrated by pouring some butane gas from a 500-cc. beaker into a small 100-cc. beaker which had been previously shown to be free of a flam-

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mable mixture. The flash which occurred in the small beaker upon the application of the flame of a match was an effective demonstration of the fact that petroleum vapors are heavier than air.

As a conclusion, the salient points of the demonstration-lecture were recapitulated. It was pointed out (1) that in order to have a fire it is necessary to have three elements present at the same time, namely vaporous fuel, air, and heat, (2) that light liquid-petroleum products are extremely hazardous because even at room temperatures and atmospheric pressures many will boil and form the base of all fires—vaporous fuel, (3) that even though special types of storage may be used for light liquids in order to prevent their vapors from coming in contact with air, improper handling may permit air to mix with the vapors and provide two elements for a fire—vaporous fuel and air, (4) that the vapors of practically all petroleum products are heavier than air and by virtue of this property such vapors in the atmosphere will tend to settle and flow along the ground, much the same as water, and possibly come in contact with a source of ignition. In such a case the three elements for a fire, vaporous fuel, air, and heat, would be present together and would result in a fire.

Considerable interest in the demonstrations was shown by the operators and it is believed that this part of the program to minimize the possibility of future refinery fires was effective in that it not only made these men more aware of the hazards involved in the handling of light liquid hydrocarbons but also provided sufficient facts so that they might recognize and, if possible, rectify conditions which could lead to a disastrous fire.

Development of Equipment and Storage Fire Protection

The second portion of the program developed by the Standard Oil Co. (Indiana) to minimize the danger of fire on light-liquid petroleum products consisted of an experimental investigation to determine the most effective means of extinguishing fires on such products. It was recognized that some types of fires might occur for which available means of extinguishment would not be completely effective. It was apparent that such a study would not only evaluate the effectiveness of available means of extinguishing fires but also would indicate the steps necessary to reduce the possibility of the occurrences of fires.

The first points to be considered were (1) the type of fires which would possibly occur on volatile hydrocarbons, (2) their probable location and (3) the most effective means for their extinguishment. In considering the types of fires which could occur and their probable location it was apparent that there would be three general classifications, namely, (1) fires on process equipment such as stabilizers, absorption towers, etc., (2) fires on lines and pumps outside battery limits, and (3) fires on storage tanks.

It was considered that the possibility of major fires on processing equipment is remote, primarily because design is such that rupture or failure is very unlikely to occur. That is, operating conditions are always much less severe than the equipment is capable of withstanding and emergency relief equipment is usually provided which will function in case the operation becomes uncontrollable. Thus fires on equipment would be limited to small fires which might occur on pumps, pipe flanges, relief valves, etc. Such fires are capable of being extinguished by snuffing steam or carbon dioxide. Vessels, lines, and supports should be well insulated, of course, to prevent direct impingement of the flames from such fires.

Except under very unusual circumstances fires on pumps and lines outside of battery limits would be limited to small fires on pump glands or leaky pipe fittings. These fires could be controlled as above. Any secondary fire which might occur should be considered separately and might require the use of water or fire foam.

It was concluded that the most likely location for a major fire would be on storage containing butane or stocks of high butane content. In many cases vapor-air mixtures are nearly always present around the vents of such tanks, thus providing two of the three necessary elements for a fire. In addition, if a fire did occur it would probably be on a large volume of liquid which could not be pumped away immediately. Because there seemed to be no definite method by which such a storage fire could be controlled, an experimental program was developed to determine (1) the type of fire which would be most likely to occur on light-liquid storage and (2) means of putting out such fires.

Absorption naphtha (20 to 40 lb. Reid vapor pressure) is stored in large cone-roof tanks under substantially atmospheric pressure. Because of the high vapor pressure of the liquid, vaporization takes place and maintains a liquid temperature of 30° to 40° F. The vapors which are evolved

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are ordinarily withdrawn through gas lines, recompressed into liquid, and returned to the tank. Under certain conditions vapors may be released through vents and become ignited, perhaps by lightning, and cause a flash which might result in one of two types of fires. If the vapors inside the tank contain practically no air the fire would probably be located at the vent. On the other hand, if sufficient air were present in the tank to form a flammable mixture, an explosion would probably result which would remove either part or all of the roof. Consequently, in the experimental work, two types of fires were considered —vent fires and open-tank fires. Various means of extinguishing such fires were then considered. The effectiveness of such common extinguishers

Fig. 5—Experimental absorption-naphtha fire tank

as steam, carbon dioxide gas, fire foam, and water from fog nozzles were chosen for investigation in the experimental program.

Experimental Investigation

The experiments were carried out in semipilot plant scale apparatus which included an open-top tank (Fig. 5) 3 ft. in diameter by 7 ft. high, in which the several fire tests were made. The tank was provided with a removable top (Fig. 6) which could be placed, when used, in a 12-in. deep water seal welded around the outside of the tank. Connections were provided for (1) fire foam, (2) carbon dioxide, (3) steam, and (4) gas and liquid samples. One inch of insulation was applied to the sides of the tank. All fires were started by means of a spark-plug arrangement so that the operators could be at a safe distance.

The apparatus used for the application of fire foam consisted of four barrels (Fig. 7) provided with suitable connections for compressed air, pressure gages, relief valves, sight glasses, and outlets for the foam solutions. The equipment was manifolded in such a manner that two barrels could be used for a premixed water solution of "A" chemical and the other for "B" solution. The two foam solutions were forced by compressed air through separate 1-in. lines and orifice meters to a point a few feet from the entrance to the tank. At this point the solutions were mixed and the resulting foam conducted into the tank by means of a 4-in. line. Since it was expected that the usual rate of foam application, 0.1 cu. ft. per sq. ft. of surface per minute, would be inadequate for extinguishing fires on absorption naphtha, this equipment was designed to deliver 10 times that rate.

For the addition of carbon dioxide, two nozzles were placed near the top and inside of the tank so that each would direct gas over approximately one-half of the liquid surface. The nozzles were connected by means of a ½-in. extra-heavy line to several 15-lb. cylinders of carbon dioxide, manifolded so that the contents of each cylinder could be turned into the line singly or together.

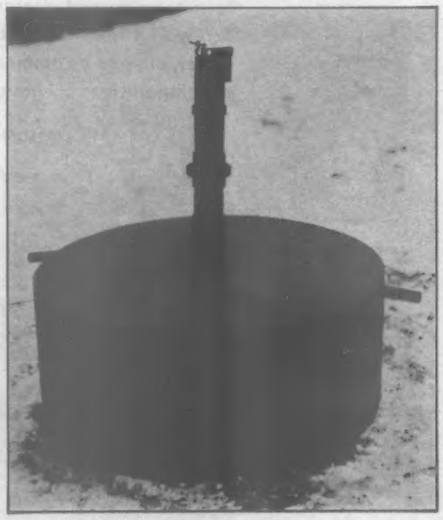


Fig. 6—Roof for experimental tank

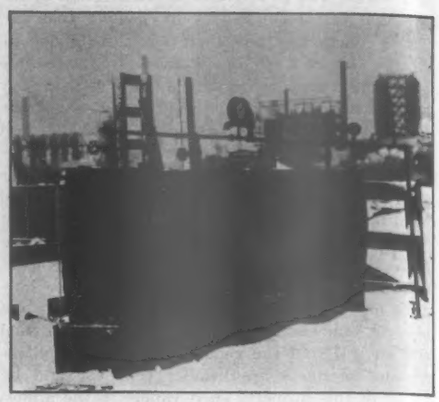


Fig. 7—Fire-foam supply

A line arrangement similar to that used for carbon dioxide was used for the addition of steam except that an orifice meter was used to aid in measuring and controlling the rate of steam addition.

In all, 19 tests were made on open-tank fires. In 16 of these, fire foam was used to extinguish the fire. The pertinent data for these tests are listed in Table 1. It will be noted that in these tests vapor pressures of the stocks after the fires were extinguished ranged from 28.7 to 4.45 lb. Reid vapor pressure and that foam application rates varied from 0.1 to 1.0 cu. ft. per sq. ft. of liquid surface per minute. In every case the foam was effective in extinguishing the fire. It was evident from this series of tests that, although extinguishment may be effected more quickly, rates of foam application higher than the usual rate of 0.1* cu. ft. per sq. ft. per minute are not necessary. It was also evident that as the Reid vapor pressure of the stock increased a thicker blanket of foam was necessary to extinguish the fire. This relationship is shown in the curve in Fig. 8. This curve indicates that open-tank fires on stocks with Reid vapor pressures greater than 44.5 lb. may be extinguished only with extreme difficulty by means of fire foam. It also indicates that the maximum Reid vapor pressure stock on which fires could be extinguished with relative ease would lie in the range of 35 to 40 lb.

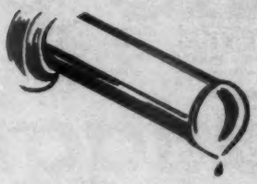
On three open-tank fires the effectiveness of carbon dioxide and steam were tested. The data for this series of tests are listed in Table 2. It was shown that steam alone even at high rates of application is not effective in extinguishing fires on

*The rate recommended for ordinary petroleum-tank fires.

TABLE 1—OPEN-TANK FIRES EXTINGUISHED BY FIRE FOAM

Test No.	Stock, R.v.p. (lb./sq. in.) Before fire	Stock, R.v.p. (lb./sq. in.) After fire	Temperatures, °F. Air	Foam solutions	Stock during burning	Stock before burning	Time fire burned Before application (min.)	Time fire burned During application (min.-sec.)	Thickness of foam layer (in.)	Rate of extinguisher application*	Notes
2	32.6	30.8	55	70	35	35	12	1'15"	18	1	
3	32.1	30.3	43	75	..	45	2	3'20"	24	1	
7	35.2	33.9	47	68	..	..	4	Foam 1'0" Foam 0-45"	18	1 1	After first application fire did not quite go out. After 5 minutes foam again applied and fire was extinguished.
8	31.1	29.3	84	80	..	..	7	1'20"	3½	0.37	
9	29.3	28.7	84	80	..	..	4	3'0"	14	0.37	Longer time required for this test as compared with Test 8. Believe to be due to contained heat in tank from fire in Test 8.
22	44.7	42.9	78	95	..	22	5	17'	†15	0.28	Fire under control in 3 minutes.
10	31.0	29.2	84	70	..	..	5	5'25"	6	0.16	Fire under control after first minute.
18	30.0	29.0	91	92	38	38	5	7½'	9	0.1	Fire under control in 2½ minutes.
13	32.0	30.2	50	..	30	30	20	5'	3	0.1	
11	30.8	32.2	47	75	..	..	3	1'20"	2	0.1	
19	34.3	33.0	91	96	35	35	5	7'	7	0.1	
14	35.5	35.2	60	95	33	32	12¼	8'30"	10	0.1	Fire under control in 1½ minutes. Outage = 12".
15	35.2	35.2	60	92	34	3[illegible]	5	8'30"	10	0.1	Fire under control in 1½ minutes. Outage = 14".
17	41.3	40.0	80	90	25	25	5	25'0"	†15	0.1	Under control in 3 minutes.
24	41.0	40.3	80	90	..	30	5	12'0"	10	0.1	Outage = 47".
23	45.5	44.5	78	95		25	5	41'0"	50	0.1	Foam at top of tank when fire went out. No overflow.

*Cubic feet per square foot of liquid surface per minute. †Foam thickness limited by outage of tank. Foam spilled over rim of tank.



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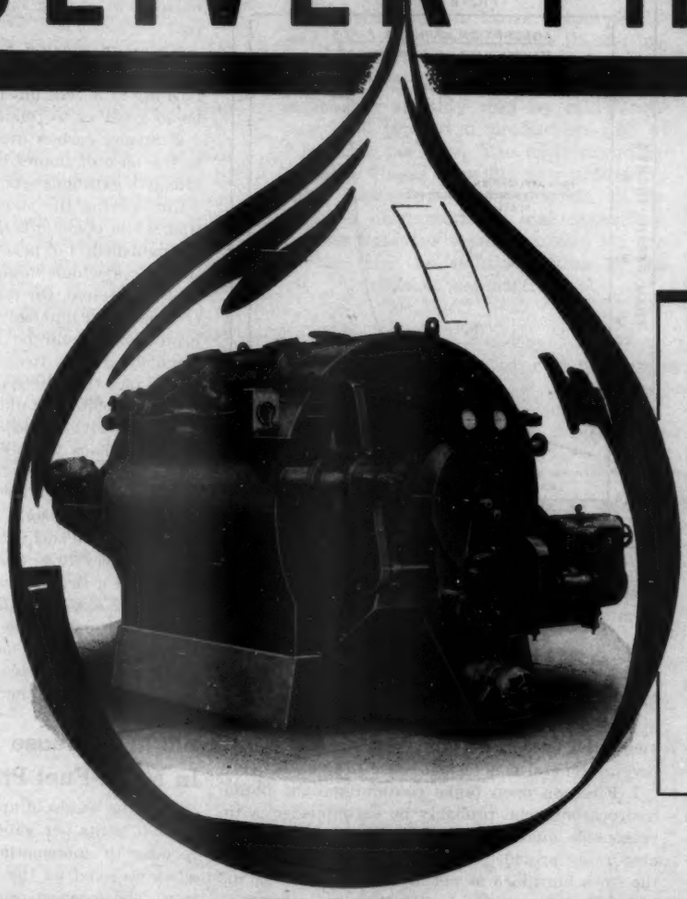

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TABLE 2—OPEN-TANK FIRES ON WHICH STEAM AND CARBON DIOXIDE WERE TESTED

Test No.	R.v.p. of stock (lb./sq. in.) Before fire	After fire	Extinguisher used	Temperatures, °F. Air	Foam solutions	Stock During fire	Stock Before fire	Min. fire burned Before application	Min. fire burned During application	Fire extinguished	Thickness foam layer (in.)	Rate of extinguisher application*	Notes
1	44.7	43.8	CO_2	40		30	30	12	2'	Yes		30 lb. CO_2/min.	Four 15-lb. cylinders discharged; 45 seconds between first and second; 45 seconds between second and third and fourth, which were discharged simultaneously.
4	30.3	30.4	Steam then foam	43	75		45-50	1	Steam 5'0" Foam 2'45"	No Yes	30	1	Flame intensity increases with the application of steam.
12	38.0	35.5	Steam then foam then CO_2	..	75	46	46	5 12 30	3'0" 18'0" 1'15"	No No Yes	24-30	0.10 1.00 30 lb. CO_2/min.	Steam made fire burn harder. Low-rate foam for 12' almost effective. Flash necessitated high rate for 5 minutes, not effective. CO_2 effective.

*Cubic feet per square foot liquid surface per minute.

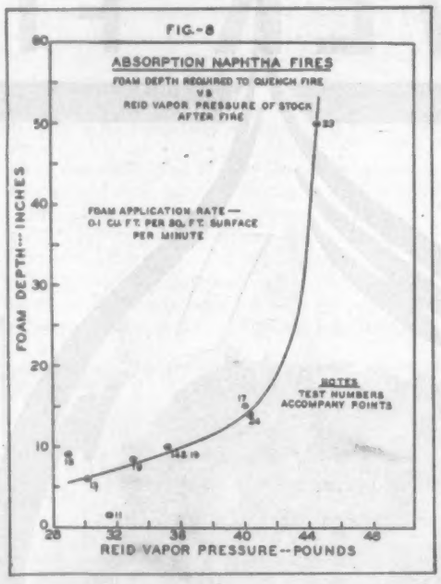
stocks even as low as 30.4 lb. Reid vapor pressure. Although carbon dioxide alone extinguished a fire on stocks as high as 43.8 lb. Reid vapor pressure an excessively large quantity of the material was required which, of course, might render its use for large-tank fires impracticable.

Five Tests Made

In all, five tests were made on vent fires on the experimental equipment. In this series, the effectiveness of carbon dioxide admitted to the vapor space of the tank and foam applied to the surface of the liquid was tested as well as the effect of applying steam to the base of the flames burning at the vent. These tests, the data for which are listed in Table 3, demonstrated that carbon dioxide and foam, in limited quantities, applied separately in the manner described above, were not effective in extinguishing a fire burning at the vent. Fire foam did extinguish one fire but not until the entire vapor space of the tank had been filled. Carbon dioxide applied over a layer of foam, however, was effective in extinguishing a fire at the vent but it was necessary to use quantities greater than would be practicable for actual conditions. Vent fires were most easily extinguished by directing steam to the base of the flames and although not tested it is probable that carbon dioxide might be equally effective when applied in this manner.

The possibility of extinguishing vent fires by means of water in the form of a fog from a fog or spray nozzle in the place of steam was investigated on apparatus which simulated a 6-in. diameter vent. This equipment consisted essentially of a 4-ft. section of 6-in. pipe placed in a vertical position, open at the top and closed at the bottom. The lower part of the pipe was connected with a source of propane gas. In the tests propane gas was passed into the 6-in. pipe at a rate sufficient to be comparable to the actual gassing of a vent on a storage tank. The flames which occurred at the top of the pipe when the gas was ignited were then extinguished by means of water fog from a fog nozzle. In all the tests the water fog extinguished the flames although it appeared to be most effective when discharged in a horizontal direction across the opening of the vent from a point 3 to 6 ft. up wind from the flame.

FIG.-8



Conclusions

Although this experimental work was carried out on equipment too small to permit the direct application of the results to storage conditions (with the exception of the tests on water fog) several general conclusions were drawn, namely:

1. Fires on open tanks containing light liquid hydrocarbons can probably be extinguished with reasonable quantities of foam applied at reasonable rates provided the Reid vapor pressure of the stock burning was not higher than 36 to 38 lb.

2. Steam would not be effective in extinguishing an open-tank fire.

3. Although carbon dioxide might be effective on an open-tank fire the amount required would be too great to be practicable.

4. Fire foam applied in limited quantities to the liquid surface would not extinguish a fire burning at a vent or at a rupture of the tank roof.

5. Carbon dioxide applied, with fire foam, to the vapor space of a tank would extinguish a fire burning at a vent but the amount required would be so great as to render its use impracticable.

6. Steam, carbon dioxide, or water fog applied to the base of flames burning at a vent would be effective extinguishers.

Considering the above conclusions, it appeared that while open-tank fires and vent fires may be extinguished, no practicable method of dealing with fires which might occur at a rupture in a roof was found. On the other hand, with a properly designed tankage system the problem of fire protection should be reduced to means for extinguishing vent fires.

The fact that the liquid in such tankage would be very volatile would make it easy to maintain a nonexplosive atmosphere in the vapor space of the tank. Thus the possibility of roof removal by explosion would be eliminated and consequently open-tank fires would be a very remote possibility. Also the design of such a storage system should provide adequate pressure relief equipment (gas-recovery lines and vents) such that the possibility of a fire occurring at a rupture in a roof, caused by excessive internal pressures, would be remote. Grounding the tanks well as a protection from lightning and locating them in an isolated area would minimize the possibility of ruptures from causes other than internal pressure.

Slight Decrease Shown In Motor-Fuel Prices

Gasoline was sold at retail for an average price of 13.43 cents per gallon on February 1, 1940, according to information from 50 representative cities received by the American Petroleum Institute. The average price was 13.53 cents on January 1 and was 13.11 cents on February 1, 1939.

Taxes averaging 5.42 cents per gallon increased the average cost to the customer to 18.85 cents per gallon, as against 18.95 cents on January 1, and 18.55 cents on February 1 last year.

TABLE 3—VENT FIRES ON WHICH FOAM, CARBON DIOXIDE, AND STEAM WERE TESTED

Test No.	R.v.p. of stock (lb./sq. in.) Before fire	During fire	Extinguisher used	Temp. °F. Air	Foam solutions	Time fire burned Before application	Time fire burned After application	Fire extinguished	Thickness of foam layer (in.)	Rate of extinguisher application*	Notes
5	33.2	32.7	CO_2 then foam	37	65	1	CO_2 2'0" Foam 3'20"	No Yes	36-40	1	Fire was extinguished only when foam filled entire vapor space of tank.
16	29.3	28.6	Foam and CO_2	89		4½	Foam 44'0" CO_2 0'52"	No Yes	3½	0.1 + 1 cyl. CO	
6	34.4	32.8	Foam then foam and CO_2	46	70	1	Foam 1'0" Foam and CO_2 0'45"	No Yes	12 12	1 30 lb. CO_2/min.	Foam was applied for 1 minute. Fire burned for 3 minutes afterward. Then CO_2 was admitted over previous foam layer.
20	30.4	30.4	Steam outside	91	..	2	Less than 5 secs.	Yes	..	.....	Steam applied to base of fire burning at vent.
21	30.4	30.4	Steam outside	91	..	6	Less than 5 secs.	Yes	..	.....	Steam applied to base of fire burning at vent.

*Cubic feet per square foot liquid surface per minte.

Refining Characteristics of Mississippi Crude Oils

By GUSTAV EGLOFF and G. B. ZIMMERMAN
Universal Oil Products Co.

THE properties of two samples of crude from the Tinsley field of Mississippi are shown in Table 1. Sample No. 10-347 represents a shipment leaving the Tinsley field by tank car and differs from the other only very slightly, showing a smaller amount of light ends and a lower gravity. The following information was submitted with sample No. 10-286:

"The sample was taken from the producers' 'B' lease, which is producing equal amounts of crude from two wells. One well produces in the Woodruff zone, a sand body in the Selma chalk formation, occurring at 4,395-4,404 ft. The other well produces oil from the Stevens sand which lies in the Eutaw formation at 4,860-83 ft. The crudes differ very little in characteristics, so the admixture may be considered as representative of the field production.

"Pressures in both reservoirs are low. The Woodruff sand well was completed making 374 bbl. daily through a 16/64-in. choke on 2-in. tubing, with tubing pressure of 160 lb. and casing pressure of 65 lb. The Stevens sand well made an initial production gage of 231 bbl. in 13 hours through a similar size choke, with tubing pressure of 180 lb. and casing pressure 20 lb. Gas-oil ratios are also low, averaging less than 400 cu. ft. per barrel. No salt water was produced in the two wells, nor in any of the field's current producers."

TABLE 1—PROPERTIES OF TINSLEY CRUDE OILS

	Sample No. 10-286	Sample No. 10-347
Properties of crudes—		
Gravity, °A.P.I. at 60° F.	35.8	35.0
Specific gravity at 60° F.	.8458	.8498
Sulfur, per cent	0.76	0.78
B.S.&W., per cent	0.1	0.2
Cold test, °F.	5	25
Viscosities:		
Kinematic at 100° F., Sec.	6.86	....
Universal at 100° F., Sec.	48.3	....
Salt as sodium chloride, lb./1,000 bbl.	7	4
100 Cc. distillation—		
I.B.P., °F.	124	130
5 per cent	194	206
10 per cent	244	255
20 per cent	334	343
30 per cent	420	440
40 per cent	5[illegible]	[illegible]
50 per cent	614	629
60 per cent	681	694
70 per cent	711	724
80 per cent	[illegible]	[illegible]
90 per cent	756	755
95 per cent	758	
End point, °F.	758	755
Per cent over	96.0	95.5
Per cent coke by weight	3.9	4.0
Per cent over at 400° F.	27.5	26.0
Per cent over at 572° F.	45.0	43.0

In general these oils are a few points lower in gravity than Mid-Continent crudes and show a lower gasoline content. These samples are quite free of salt and the attendant corrosion problems should not be troublesome.

Laboratory fractionation was carried out at atmospheric pressure for the production of 400° F. end-point gasoline and kerosene and under vacuum for light gas oil as a burner distillate base and paraffin distillate as a lubricating-oil base stock with the corresponding residues. A 250° F. end-point gasoline and a naphtha were also produced to cover the possibility of octane-number increase with end point reduction. The yields of these fractions are given in Table 2 and their properties in Table 3. A number of unusual characteristics are evident from these data: The lighter fractions are highly paraffinic and are low in octane number and sulfur content. Mercaptan

The Tinsley field in Yazoo County, Mississippi, brings to that state its first important crude-oil production. Since its discovery in the summer of 1939, it has expanded steadily and by mid-February 1940 passed a production rate of 7,500 bbl. per day. The widespread interest in the oil from this new producing area prompted an evaluation of its refining characteristics and accordingly two samples were obtained for analysis and the refining value of the crude is reported here.

TABLE 2—YIELDS OF FRACTIONS FROM TINSLEY CRUDE SAMPLE NO. 10-286

Yields, vol. per cent of crude—	Breakup number 1	2	3	4	5
Gasoline, 250° F. end point	12.6	...	...	...	...
Gasoline, 400° F. end point	...	29.2	29.2	29.2	29.2
Naphtha	16.6	...	...	...	...
Kerosene	...	...	9.5	9.5	9.5
Light gas oil	...	...	...	21.4	21.4
Heavy gas oil	...	...	...	...	19.8
Topped crude	70.6	70.6	...	...	...
Reduced crude	...	...	61.1	...	...
Crude residue	...	...	...	39.7	19.9
Water	0.1	0.1	0.1	0.1	0.1
Recovery	99.9	99.9	99.9	99.9	99.9
Loss	0.1	0.1	0.1	0.1	0.1

TABLE 3—LABORATORY BREAK-UP OF TINSLEY, MISSISSIPPI, CRUDE SAMPLE NO. 10-286

Properties of distillate fractions—	Gasoline, 250° F. end point	Naphtha	Gasoline, 400° F. end point	Kerosene	Light gas oil	Heavy gas oil
Gravity, °A.P.I. at 60° F.	79.5	56.3	65.3	44.9	34.4	25.8
Specific gravity at 60° F.	.6706	.7535	.7190	.8022	.8529	.8996
Total sulfur, per cent	0.01	0.01	0.01	0.05	0.46	0.99
Mercaptan sulfur, per cent	Sweet	Sweet	Sweet	0.001	....	....
Reid vapor pressure, lb./sq. in.	14.1	....	7.3	....	....	....
Octane number, M.M.	61.0	26.0	41.0	...	....	....
Viscosities:						
Kinematic at 100° F., Cs.	....	....	....	1.877	5.83	55.06
Universal at 100° F., Sec.	....	....	....	32.1	45.0	255
Cold test, °F.	....	....	....	....	Below 0	80
Characterization factor	12.75	12.22	12.42	12.09	11.94	11.84
100 Cc. distillation—						
I.B.P., °F.	84	254	102	410	530	665
5 per cent	107	268	140	423	541	704
10 per cent	117	277	160	426	545	710
20 per cent	133	289	193	430	556	722
30 per cent	144	299	218	435	569	737
40 per cent	156	309	242	441	581	747
50 per cent	167	320	264	447	594	756
60 per cent	179	331	284	454	608	+760
70 per cent	192	344	306	462	622	....
80 per cent	207	360	330	472	642	....
90 per cent	226	381	360	490	671	....
95 per cent	240	393	380	507	700	....
End point, °F.	253	412	398	524	709	+760
Per cent over	98.0	99.0	98.5	99.0	99.0	98.5
Per cent bottoms	1.0	1.0	1.0	1.0	1.0	1.5
Per cent loss	1.0	....	0.5	....	....	....

Properties of residual fractions—	Topped crude	Reduced crude	Crude residues	
Gravity, °A.P.I. at 60° F.	26.2	23.8	18.5	12.0
Specific gravity at 60° F.	.8973	.9111	.9433	.9861
Total sulfur, per cent	1.03	1.19	....	2.02
Viscosities:				
Universal at 100° F., Sec.	193	....	....	....
Universal at 210° F., Sec.	47.2	59.4	170	....
Furol at 210° F., Sec.	....	....	....	....
Basic sediment and water, per cent	0.1	0.2	....	....
Cold test, °F.	20	40	60	70
Flash, Pensky-Martens, °F.	230	290	....	....
Residue of specified penetration, per cent	39.7	....	....	....
Penetration of residue, 100 g./5 sec./77° F.	97	....	....	....
Characterization factor	11.90	11.88	11.82	11.79
100 Cc. distillation—				
I.B.P., °F.	440	538	585	420
5 per cent	478	563	680	570
10 per cent	500	585	692	600
20 per cent	560	632	704	664
30 per cent	617	668	717	695
40 per cent	672	685	725	706
50 per cent	694	699	732	725
60 per cent	707	711	738	....
70 per cent	719	722	745	....
80 per cent	733	732	755	....
90 per cent	748	746	....	....
End point, °F.	748	746	758	725
Per cent over	94.0	93.5	91.0	82.0
Per cent coke by weight	5.6	6.5	8.9	17.8

TABLE 4—ESTIMATED REFINING YIELDS PROCESSING TINSLEY CRUDE

	Operation 1	Operation 2	Operation 3	Operation 4
Topping operation yields, vol. per cent—	Per cent of crude			
Crude charge	100.0	100.0	100.0	100.0
Straightrun gasoline, 400° F. end point (41 O.N.)	29.2	29.2	29.2	29.2
Kerosene	....	9.5	....	9.5
Topped or reduced crude	70.6	61.1	70.6	61.1
Recovery	99.8	99.8	99.8	99.8
Water and loss	0.2	0.2	0.2	0.2

	Operation 1		Operation 2		Operation 3		Operation 4	
Estimated prefractionation and reforming yields, vol. per cent—	Per cent							
	Charge	Crude	Charge	Crude	Charge	Crude	Charge	Crude
Gasoline charge	100.0	29.2	100.0	29.2	....	....	....	....
Reformed and light straightrun gasoline (67-68 octane)	85.0	24.8	85.0	24.8	....	....	....	....
Reforming residue	3.0	0.9	3.0	0.9	....	....	....	....
Recovery	88.0	25.7	88.0	25.7	....	....	....	....
Gas and loss	12.0	3.5	12.0	3.5	....	....	....	....
Estimated cracking yields, vol. per cent—								
Topped or reduced crude charge	100.0	70.6	100.0	61.1	100.0	70.6	100.0	61.1
Cracked gasoline (68-70 octane)	55.0	38.8	50.0	30.5	55.0	38.8	50.0	30.5
Residual fuel oil (No. 6)	37.0	26.1	44.0	26.9	37.0	26.1	44.0	26.9
Recovery	92.0	64.9	94.0	57.4	92.0	64.9	94.0	57.4
Gas and loss	8.0	5.7	6.0	3.7	8.0	5.7	6.0	3.7
Gas polymerization, estimated yields, vol. per cent—								
Polymer gasoline (82 octane)		2.6		2.2		1.7		1.3

	Operation 1	Operation 2	Operation 3	Operation 4
Overall yields, vol. per cent—	Per cent of crude			
Crude charge	100.0	100.0	100.0	100.0
Straightrun gasoline, 400° F. end point	....	....	29.2	29.2
Reformed and light straightrun gasoline	24.8	24.8	....	....
Cracked gasoline	38.8	30.5	38.8	30.5
Polmer gasoline	2.6	2.2	1.7	1.3
Total gasoline	66.2	57.5	69.7	61.0
Kerosene	....	9.5	....	9.5
Residual fuel oil (No. 6)	27.0	27.8	26.1	26.9
Recovery	93.2	94.8	95.8	97.4
Water and loss	6.8	5.2	4.2	2.6

sulfur is practically absent and no sweetening is required. On the other hand, the heavy residues are more aromatic and contain relatively high concentrations of sulfur. It will be noted that although the asphalt residue of 97 penetration determined on the topped crude is 39.7 per cent or 28 per cent based on the crude oil, the 19.9 per cent vacuum residue from the crude is much less viscous. This indicates a ready response to oxidation during the asphalt residue determination and the possibility of successful preparation of air-blown asphalts from the Tinsley crude with yields of over 25 per cent.

The properties of the light gas oil and kerosene show that No. 2 furnace oil and diesel fuel with cold tests below zero may be produced in quantities up to 30 per cent of the crude. Preparation of satisfactory lubricating oils from the heavy gas oil will require dewaxing to reduce the high cold test and probably solvent extraction in addition to decolorizing treatment.

Low-Octane Gasoline

The low octane rating of the straightrun gasolines, even those with very low end points, may constitute a serious problem in marketing this crude unless blending with higher octane-number material is resorted to. Cracking of the topped or reduced crude oil provides a solution, and the addition of reforming eliminates the problem of low-octane gasoline disposal. Yields were accordingly estimated for four of the many possible operations incorporating cracking. The first assumes removal of 400° F. end-point gasoline and cracking of the topped crude to produce 400° F. end-point 68 to 70-octane number cracked gasoline and a residue of No. 6 fuel-oil quality. The 400° F. end-point gasoline, by combined prefractionation for removal of light gasoline and thermal reforming of the remaining naphtha, is converted to a 65-octane-number product. Polymerization of the gases from the cracking and reforming operations is incorporated to increase the overall gasoline yield and octane rating.

The second operation is similar to the first, but includes removal of kerosene in the topping operation and cracking of the reduced crude. In the third and four operation reforming is eliminated, giving as products straightrun and cracked gasoline (with kerosene in the fourth operation), and No. 6 fuel oil. Table 4 shows the estimated yields for these four operations in detail.

From the first operation, including reforming, it is estimated that 66.2 per cent gasoline of 68 to 70-octane number will be obtained, which may be brought to market specifications by sweetening and the addition of dye, inhibitor and a small amount of tetraethyl lead. A fuel-oil yield of 27 per cent and gas account for the remainder of the crude.

From the second operation, 57.5 per cent of 67 to 69-octane gasoline, 9.5 kerosene and 27.8 per cent fuel oil are obtained. Finishing of the gasoline involves the same procedure as for the first operation. Yields from the third operation include 29.2 per cent of 41-octane-number straightrun gasoline, 40.5 per cent cracked and polymer gasoline of 68 to 70-octane number, and 26.1 per cent fuel oil. In the fourth operation 9.5 per cent kerosene is made at the expense of a reduction in cracked and polymer gasoline to 31.8 per cent. Since the straightrun gasoline is sweet as distilled and will probably be sold unblended, no treatment is required. The cracked gasoline from the third and four operations may be finished in the same manner as that from the first operation, but because of the rather high sulfur content of the reduced crude, the gasoline from this charge may contain over 0.1 per cent sulfur.

It has been noted that Tinsley crude has a number of unusual characteristics. It is not, however, unique since a number of other crudes from the northern Louisiana and Arkansas districts show similar properties. The crude produced in 1937 from the Lisbon, Louisiana, field, for example, is strikingly similar to the Tinsley production in all important characteristics. It may be concluded that while this new Mississippi crude presents some refining problems, modern refining technique properly applied can convert it to products competitive with the markets of today.

The authors are indebted to George Weber of The Oil and Gas Journal for assistance in obtaining the crude sample and field information covered above.

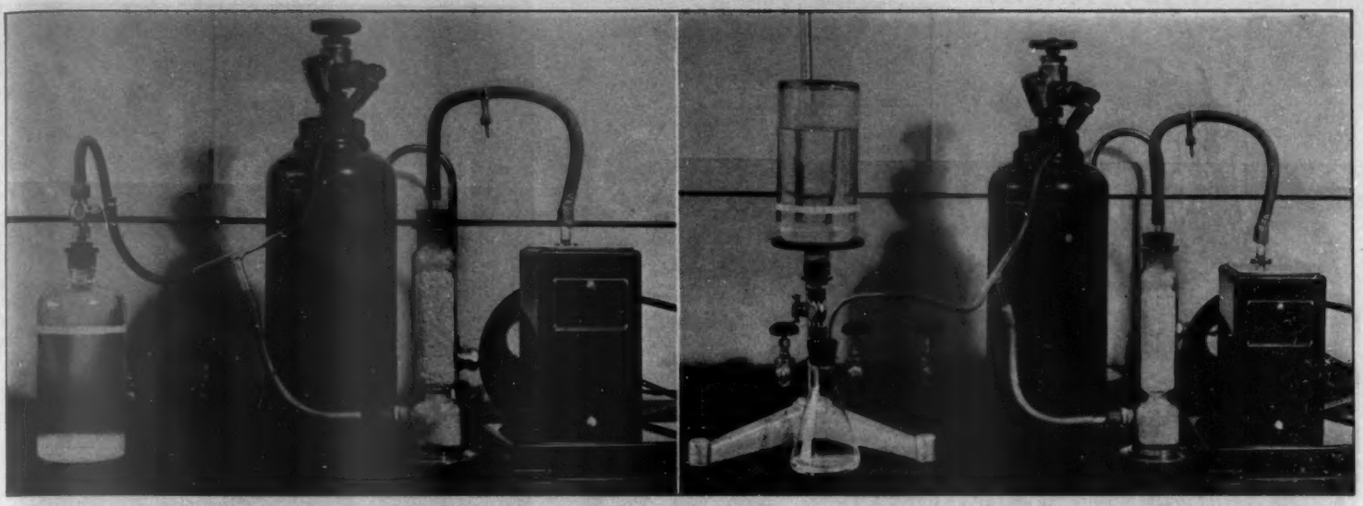
Lion Adds to Processing Capacity

DURING the past year, Lion Oil Refining Co., at El Dorado, Ark., increased its crude-refining capacity, and at the same time constructed a new Lummus combination gas-oil cracking and reforming furnace. A centralized control building was erected to house instruments for operation of a light-crude unit and two different cracking plants, resulting in a considerable labor saving over the previous method of independent operation. A new cracked-gasoline stabilizing plant was also constructed and put into operation.

Several new features and developments were incorporated in the Hoover copper chloride treater for straightrun gasoline which Lion recently completed. Operation of this unit for a time on cracked gasoline showed such successful results that a Hoover process for treating all of Lion's cracked gasoline is now being installed. It was found with cracked gasoline that no chemical wash or antiactivator after treatment was required, and only the addition of a small amount of inhibitor is necessary. The inhibitor is needed only for controlling copper-dish gum as the induction period is greatly increased by this method of treatment. About one-third as much inhibitor was found to be required as with doctor treating, and the cracked product is stable in storage after treatment.

The Lion research department recently developed an asphaltic paper impregnator for use in paper and cloth bags which are subjected to high filling temperatures.

New cracking and reforming heater in the El Dorado, Ark., plant of the Lion Oil Refining Co.



Left: Apparatus used for evacuating sample bottle. Right: Apparatus used in separating gasoline and aqueous solution

Determination of Dissolved Oxygen in Gasoline

By W. A. SCHULZE, J. P. LYON, and L. C. MORRIS
Phillips Petroleum Co. Research Department

THE determination of dissolved oxygen in water is most commonly made by use of the Winkler procedure or modifications of it such as that of Rideal-Stewart. Briefly stated, the Winkler method consists in bringing the water sample to be analyzed in intimate contact with a precipitate of manganous hydroxide. The oxygen dissolved in the sample is absorbed by the manganous hydroxide, forming a mixture of higher oxides of manganese, which, on acidification in the presence of an iodide, releases iodine in a quantity chemically equivalent to the oxygen content of the sample. The amount of liberated iodine is then determined by titration with a standard solution of sodium thiosulfate.[1] Starch solution is commonly used as the indicator; however, use of an electrometric titration has recently been reported.[2]

Some years ago this manganous hydroxide-iodine method was adapted by Drennan[3] and Reid[4] to the determination of dissolved oxygen in gasoline and used subsequently in the refinery and research laboratories of the Phillips Petroleum Co. More recently the method has been studied in minute detail with the purpose of increasing its accuracy and, also, to adapt it to field testing.

An alkaline aqueous solution containing suspended manganous hydroxide and the gasoline being tested are agitated together in a bottle from which oxygen has previously been removed. Oxygen is transferred from the gasoline to the aqueous phase, and is consumed through oxidation of the manganous hydroxide to higher oxides of manganese. The equation given below represents the oxidation of manganous hydroxide to one of the higher oxides of manganese.

$$4Mn(OH)_2(\text{White ppt.}) + O_2 = 4MnO(OH)\ (\text{Brown ppt.}) + 2H_2O$$

The aqueous solution with suspended solids is removed from the bottle, and on acidification the higher oxides of manganese liberate iodine from hydriodic acid. Using the oxide chosen above for illustration, the reaction may be represented by this equation:

$$2MnO(OH) + 2HI + 4HCl = 2MnCl_2 + 4H_2O + I_2$$

From a determination of the amount of iodine liberated the oxygen content of the original gasoline is calculated.

Reagents and Materials

1. *Manganous sulfate.*—480 g. of c.p. hydrated manganous sulfate ($MnSO_4.4H_2O$) per liter of solution. Filter before using.
2. *Alkaline potassium iodide.*—700 g. of potassium hydroxide (KOH) or 500 g. sodium hydroxide (NaOH) and 150 g. potassium iodide (KI) per liter of solution. The potassium iodide used should be free of iodates. The solution should not give any color with starch, when diluted and acidified.
3. *Hydrochloric acid.*—Concentrated c.p. acid.
4. *Sodium thiosulfate.*—*N*/50 solution. Prepared from Fixanal or by dissolving 4.964 g. c.p. hydrated sodium thiosulfate ($Na_2S_2O_3.5H_2O$) per liter of solution. Use freshly boiled and cooled distilled water. Sodium thiosulfate solution is a relatively unstable reagent and should be made up fresh every few weeks.
5. *Starch solution.*—Starch solution suitable for iodine indicator, preferably made from arrowroot starch, because of greater stability. A fresh solution should be prepared at frequent intervals.
6. *Sampling bottle.*—Round quart bottle calibrated to hold 775 ml. and fitted with a one-hole rubber (or preferably duprene) stopper and ¼-in. Hoke valve with rubber hose adapters on each end.
7. *Vacuum pump.*—Pump capable of reducing the pressure to 0.1 mm. and provided with drying tower for intake port.
8. *Flask.*—250-ml. Erlenmeyer equipped with two-hole rubber stopper and delivery tube to connect with vacuum pump.
9. *Pipette, burette, etc.*—10-ml. pipette, 10-ml. pipette calibrated in milliliters, 50-ml. burette calibrated in 0.1 ml., and 100-ml. graduated cylinder.

Comments on Reagents

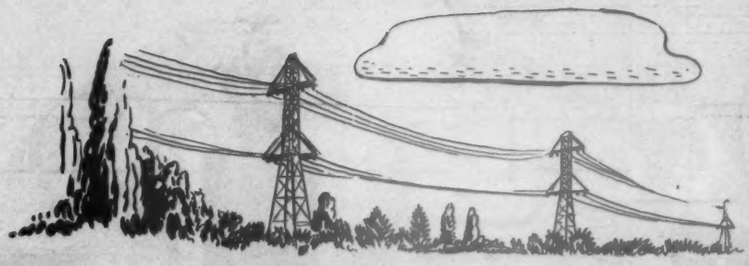
In order to keep unnecessary variables from entering the determination, freshly boiled and cooled distilled water is used throughout the entire determination. It appears that the overall accuracy of the method does not warrant more complete and time-consuming deaeration of the water used.

Rubber stoppers used in making sample bottles should be carefully washed with soap and water to remove all adhering sulfur.

Procedure

Into a clean, calibrated sampling bottle are introduced 100 ml. distilled water and 10 ml. manganous sulfate solution. A one-hole rubber stopper fitted with a Hoke valve is sealed into the bottle with cellulose-ester cement and the bottle evacuated to limit of the pump. Since all air must be removed from the bottle at this time, it is desirable to allow the solution to boil under reduced pressure for several minutes, alternately evacuating and flushing the bottle with gas such as air-free propane or air-free nitrogen. When the sample bottle is prepared and evacuated in this manner it should be possible to hear the water snap upon shaking the bottle. It is imperative that there be no leaks, either at the stopper or the valve.

After the bottle has been evacuated and disconnected from the pump, 7 ml. of alkaline iodide solution followed by 8 ml. of distilled water are added through the Hoke valve, care being taken that no air is admitted at this time. After agitation, the precipitated manganous hydroxide must be absolutely white, since a yellow or brownish shade



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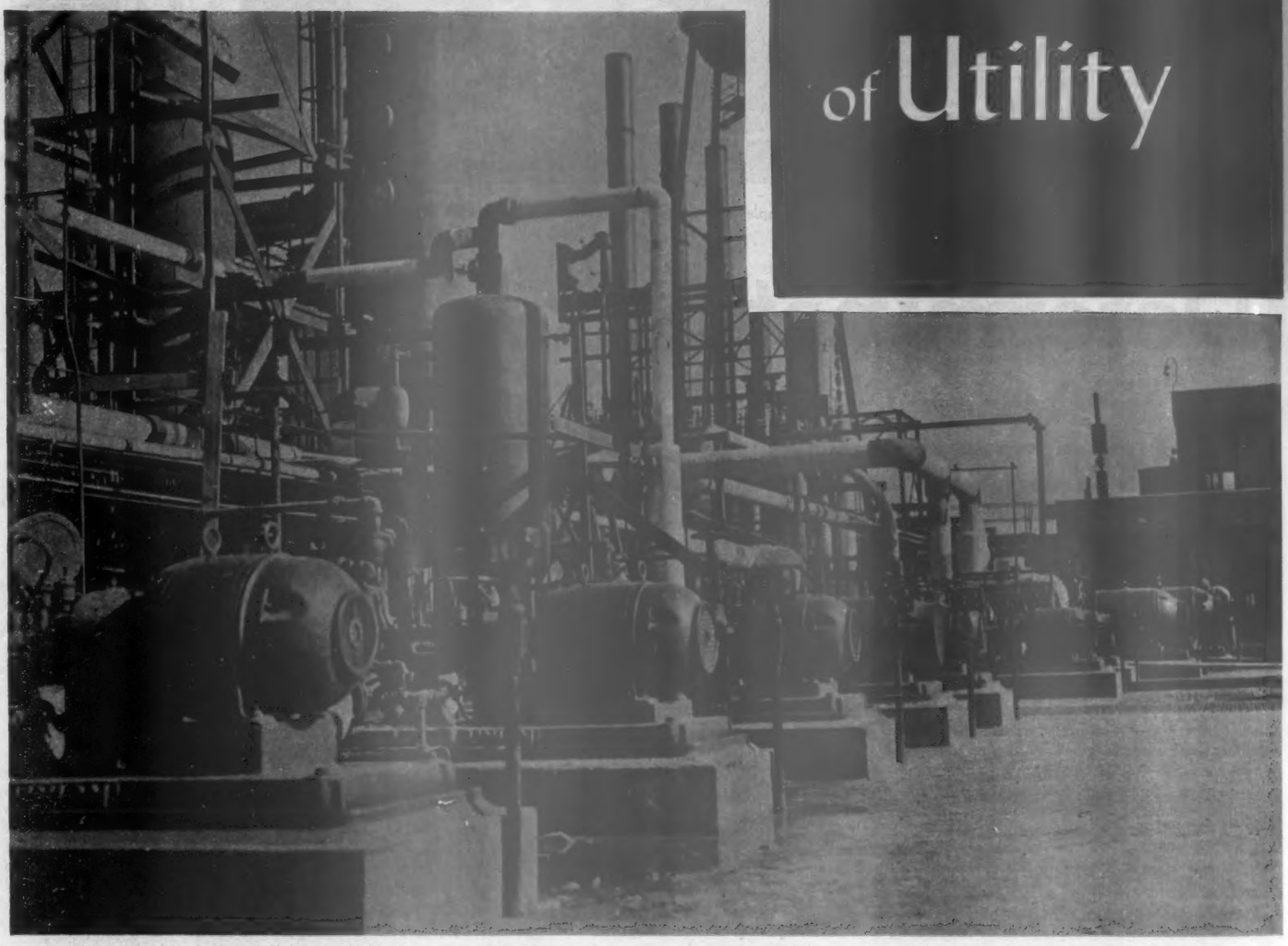

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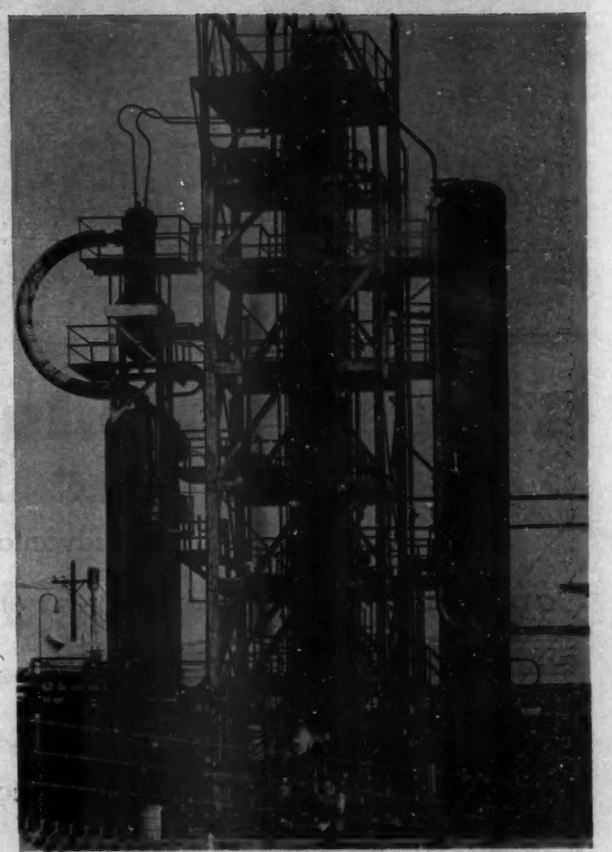

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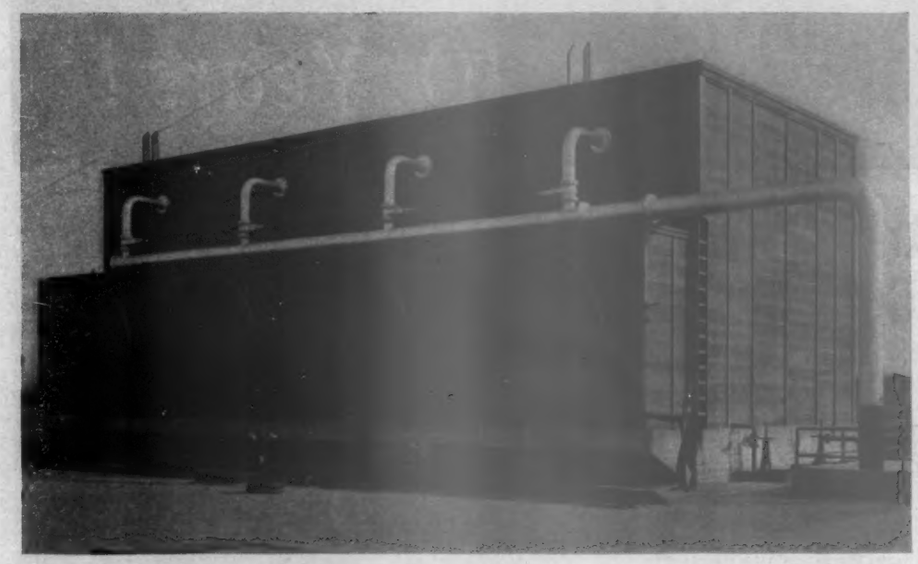
indicates that the bottle was contaminated in some way and must be discarded. If the sample bottle is to stand for any length of time before being used, it is well to keep the hose connection and valve filled with water.

Gasoline is then introduced into the sampling bottle, care being taken that no air other than that in the gasoline is allowed to get into the bottle and that the sample is truly representative of the gasoline being tested. The sampling connection must be liquid full before sampling is begun, and the gasoline being tested and sampling lines should be kept above atmospheric pressure while sample is being withdrawn. The sample bottle is vigorously shaken for 1 hour to secure as nearly as possible a quantitative transfer of oxygen from the gasoline to the aqueous phase. If an emulsion forms during the shaking operation, this may be broken by adding a small amount of isopropyl alcohol. Darkening of the aqueous layer indicates the gasoline contains oxygen.

TABLE 1—TYPICAL OXYGEN DETERMINATIONS SHOWING EFFECT OF VARIATION OF CONTACT TIME AND CONCENTRATION OF REAGENTS

Volume of manganous sulfate (milliliters)	Volume of water (milliliters)	Shaking period (minutes)	Volume of oxygen actually present (milliliters per liter)	Volume of oxygen determined (milliliters per liter)	Per cent recovery
1	50	15	5.45	4.28	78.6
1	50	15	14.40	4.20	29.2
1	100	120	6.30	5.79	92.0
1	100	60	2.18	2.16	99.2
1	100	60	7.44	5.85	78.7
5	100	60	6.82	6.76	99.5
10	100	15	13.50	6.75	50.0
10	100	60	7.25	7.41	102.4
10	100	60	11.00	10.41	94.7



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The aqueous and gasoline phases are separated by inverting the sampling bottle and inserting the hose connection of the Hoke valve into one hole of the rubber stopper in the Erlenmeyer flask. The Erlenmeyer flask is previously prepared by adding 10 ml. distilled water and 35 ml. hydrochloric acid. By a connection through the other hole of the stopper in the Erlenmeyer flask, the flask is evacuated until the hydrochloric acid begins to boil, flushed with air-free nitrogen or propane, and again evacuated sufficiently to cause the aqueous phase and precipitate to flow from the bottle into the flask. As much as possible of the solution and solid should be transferred to the flask, but no gasoline should be allowed to enter it.

In the acid solution the higher manganese oxides liberate iodine from hydriodic acid which causes the solution to become yellow or brown. After removing the stopper from the flask, the iodine solution is titrated with standard thiosulfate solution until it becomes a pale yellow. One milliliter of starch solution is added and the titration continued to the end point.

Duplicate determinations should always be made.

Calculations

When a 650-ml. sample of gasoline is used, 1 ml. of *N*/50 sodium thiosulfate is equivalent to 0.173 ml. oxygen (standard temperature and pressure) per liter of gasoline.

Typical Data

A large number of oxygen determinations have been made using measured quantities of oxygen gas and propane gas or liquid gasoline as the diluent to establish the minimum contacting time necessary and optimum amount of reagents desirable to use to effect complete recovery of the oxygen added. Experiments have indicated no great difference in ease of transfer of oxygen from gas or liquid to the aqueous phase. Typical results, showing the effect of contact time and concentration of reagents on removal of oxygen are given in Table 1. In all cases the amounts of alkaline iodide and hydrochloric acid were varied in proportion to the amount of manganous sulfate added. From the data it will be seen that 10 ml. of manganous sulfate and agitation for 1 hour are necessary for ordinary gasoline samples.

In Table 2 are found results of typical duplicate determinations on straightrun gasoline. If the average value is taken as correct it will be seen that, in general, individual determinations vary from the actual value of ±5 per cent. In the determination of oxygen in reference fuel fewer variables are encountered than in similar tests with straightrun gasoline, whereas with cracked gasoline more variables are encountered.

TABLE 2—TYPICAL DUPLICATE DETERMINATIONS WITH SAMPLES OF STRAIGHTRUN GASOLINE

Trial 1 (milliliters per liter)	Trial 2 (milliliters per liter)	Average (milliliters per liter)	Per cent difference
6.46	7.40	6.93	13.5
0.55	0.49	0.52	11.5
0.56	0.56	0.56	0.0
8.33	7.58	7.95	9.5
7.00	6.25	6.62	11.3

Typical determinations of oxygen with propane gas as the diluent are given in Table 3. The vol-

ume of oxygen could be measured to ±0.1 ml.

TABLE 3—TYPICAL DETERMINATIONS OF OXYGEN IN PROPANE GAS

Volume of oxygen present (milliliters per liter)	Volume of oxygen determined (milliliters per liter)	Per cent recovery
6.82	6.79	99.5
6.95	6.97	100.0
2.05	2.05	100.0
5.29	5.25	99.4
10.97	10.31	94.0
11.00	10.40	94.7

Discussion

Inherent in this determination are several sources of error. Some of these can be eliminated or minimized by careful manipulation while others, although small, are not subject to control. If several milliliters of air leak into the sample bottle before the gasoline is added a darkening of the manganous hydroxide can be observed easily enough and the test should be discarded. Smaller leaks are more troublesome but normally can be detected by observation of the inverted bottle. Even when great care has been used in carrying through a determination, certainty of freedom from all important leaks at any time during a determination is best indicated by agreement of duplicate results.

In transferring the gasoline to the sample bottle it must be remembered that when a vapor phase is present oxygen will distill from liquid to vapor if the pressure is allowed to drop or the temperature of the sample is raised. This error will be eliminated by transferring the sample under pressure in such a way that no vapor phase is formed. Once the sample is in the bottle distillation of oxygen from the liquid to the vapor space takes place, but experiments have shown that transfer of oxygen from vapor to aqueous phase is not appreciably harder than transfer from liquid gasoline to aqueous phase, hence, errors from this source are of no consequence.

Mechanical separation of gasoline from the aqueous phase in the sample bottle after agitation is often very slow, due to formation of emulsion around the suspended manganese salts. If all of the aqueous phase and solids are not transferred to the flask, a low result for oxygen will be obtained, but if gasoline, particularly that containing unsaturates, is transferred a low result will be obtained due to reaction of liberated iodine with unsaturates. There is some possibility that all of the oxygen present will not be determined in a badly emulsified sample although the best information at the present time indicates that errors from this source are not serious, if all solid and aqueous phase is transferred to the acid solution. Careful technique will minimize, but not eliminate errors from these sources.

Two other possible sources of error are: (1) Solution of unsaturates or readily oxidizable compounds in the alkaline aqueous phase which will subsequently react with the iodine, and (2) loss of iodine from the solution in the Erlenmeyer flask while under partial vacuum. The first of these generally occurs only with cracked gasoline. The second can be minimized through evacuating the Erlenmeyer flash only as much as necessary to cause the gasoline to flow from the sample bottle.

The procedure as developed is applicable to sweetened gasolines. In some cases where it is desired to determine the oxygen content of a gasoline containing alkaline soluble mercaptans which will react with iodine, modification of the procedure makes it possible to correct for the presence of these compounds. The presence in gasoline of other compounds which would interfere with the determination is unlikely.

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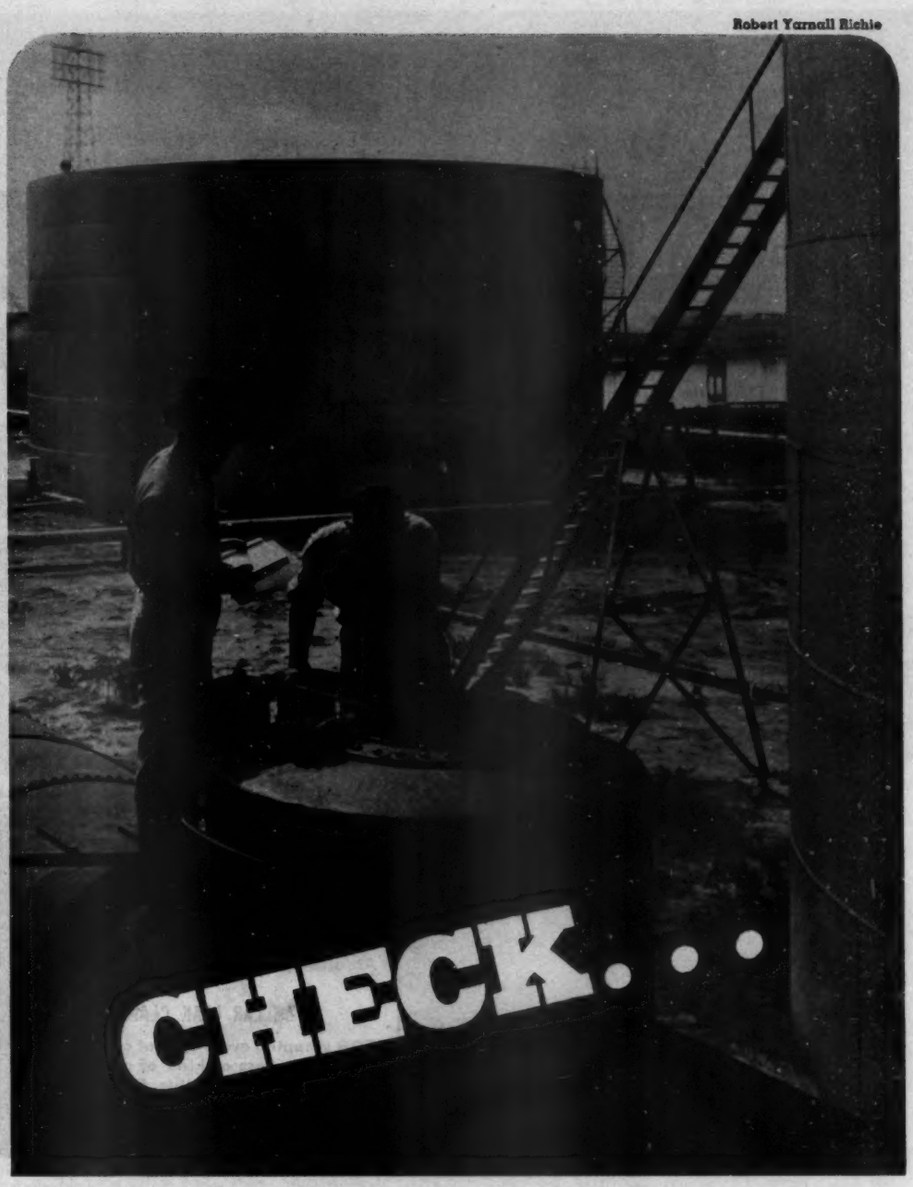
Robert Yarnall Richie



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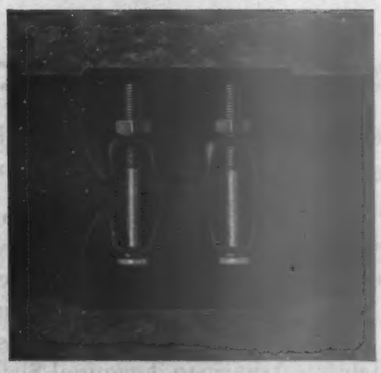

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L. H. Prichard, *Pres.* J. Steve Anderson, P. H. Anderson, *V. P.s.* T. H. Marshall, *Sec.* P. H. Anderson, *Treas.* C. L. Mayhall, C. H. Dresser, *Sales Mgrs* George H. Burruss, *Gen. Mgr. Ref.* M. B. Burruss, *Supt. Ref.* B. I. Scoggin, *Mgr. R.* and *D.* M. H Champion, *Traf. Mgr.* Refinery located at Cyril Okla.

Arkansas Fuel Oil Co., Box 1734, Shreveport, La.

T. W. Tutwiler, *Pres.* D. W. Harris, *V. P.* and *Gen Mgr.* A. F. Holliday, J. A. Welch, *V. P.s.* J. S. Sheffield, *Sec.* M. J. Lasseigne, *Treas.* A. H. Weyland, *Gen. Supt.* J. A. Welch, *Sales Mgr.* R. B. Pierce *Mgr. Ref.* H. R. Smith, *Supt. Ref.* G. W. Wilbur *Asst. Supt.* A. W. Trusty, *Ch. Chem.* H. T. Goss, *Ch. Engr.* C. B. Whyte, *Ref. Ch. Engr.* J. Lucas, *Pur. Agt.* E. M. Hinkle, *Traf. Mgr.* Refinery located at Bossier City, La.

Aromalene, Inc., 1840 E. Twenty-ninth St., Long Beach, Calif.

J. L. Crawford, *Pres.* G. A. Weeden, *V. P.* M. C. Valdes, *Sec.-Treas.* J. L. Crawford, *Gen. Mgr. Ref* M. C. Valdes, *Ch. Engr.* G. A. Weeden, *Pur. Agt. (crude).* Refinery located at Long Beach, Calif.

Arro Oil & Refining Co., Lewistown, Mont.

H. H. Schwartz, *Pres.* Ed L. Allen, *V. P., Treas.,* and *Gen. Mgr. Ref.* Guy R. Enlow, *Sec.* T. R. Gilmour, *Sales Mgr.* and *Traf. Mgr.* Paul Jones, *Gen. Supt. Ref.* Paul Cooper, *Ch. Chem.* Refinery located at Lewistown, Mont.

Ashland Oil & Refining Co., Ashland, Ky.

James L. Martin, *Chm. Bd.* Paul G. Blazer, *Pres.* W. H. Keffer, *V. P.* E. L. McDonald, *Sec.* E. W. Seaton, *Treas.* E. F. Wells, *Sales Mgr. Whsle.* A. A. Hines, *Sales Mgr. Retl.* F. W. Irwin, Catlettsburg, *Gen. Supt. Ref.* Alex S. Chamberlain *Personnel Mgr.* M. C. Dupree, *Trans. Mgr.* H. A. Blackstone, Catlettsburg, *Process Supt.* John S. Pfarr, Catlettsburg, *Mgr. R. and D.* and *Ch. Chem.* F. Leo Bever, Catlettsburg, *Ch. Engr.* M. K. Lovell, *Pur. Agt.* P. H. Banks, *Traf. Mgr.* Refinery located at Catlettsburg, Ky.

Atlantic Refining Co., The, 260 S. Broad St., Philadelphia, Pa.

Robert H. Colley, *Pres.* W. D. Anderson, E. J Henry, W. C. Yeager, W. M. O'Connor, E. H. Blum Robert C. Tuttle, A. A. Garrabrant, W. M. Irish III. *V. P.s.* W. M. O'Connor, *Sec.* Paul Shuman, *Treas.* W. C. Yeager, *Dom. Sales Mgr.* W. D. Anderson, *Expt. Sales Mgr.* E. J. Henry, *Gen. Mgr. Ref.* H. M. Nichols, *Ref. Mgr., Philadelphia.* M. J. Welsh, *Ref. Mgr., Atreco.* W. F. Stroud, Jr., *Asst. Mgr., Philadelphia.* Robert Stewart, *Asst. Mgr., Atreco.* Dr. T. G. Delbridge, *Mgr. R.* and *D.* H. M. Hancock. *Ch. Chem.* L. M. Goldsmith, *Ch. Engr.* J. S. Parks, *Pur.*

ABBREVIATIONS USED

Chm. Bd.—Chairman of Board.
Pres.—President.
V. P.—Vice President.
Sec.—Secretary.
Treas.—Treasurer.
Sales Mgr. Whsle.—Sales Manager Wholesale.
Sales Mgr. Retl.—Sales Manager Retail.
Gen. Mgr. Ref.—General Manager of Refining.
Gen. Supt. Ref.—General Superintendent of Refining.
Ref. Supt.—Refinery Superintendent.
Asst. Supt.—Assistant Superintendent.
Mgr. R. & D.—Manager of Research and Development.
Ch. Chem.—Chief Chemist.
Ch. Engr.—Chief Engineer.
Pur. Agt.—Purchasing Agent.
Traf. Mgr.—Traffic Manager.

Agt. Robert C. Tuttle, *Trans. Mgr.* Refineries located at Philadelphia, Pa., and Atreco, Tex.

Atlas Pipe Line Corp., Atlas Bldg., Shreveport, La.

John M. Madison, *Pres.* H. K. Phelps, Jr., *Trustee.* B. F. Connolly, *V. P.* and *Gen. Mgr.* under *Trustee.* Arthur N. Sample, *Sec.-Treas.* J. B. Rogerson, *Ref. Supt.* Vernon B. Chance, *Asst. Supt.* R. D. Rushing, *Ch. Chem.* R. W. Nix, *Pur. Agt.* Refinery located at Jewella, La.

Atlas Refining Co., 5776 Cherry Ave., North Long Beach, Calif.

J. H. Thomas, *Pres.* J. D. Thomas, *Sec.-Treas.* Dean Thomas, *Gen. Mgr.* Refinery located at North Long Beach, Calif.

Aurora Gasoline Co., 15911 Wyoming Ave., Detroit, Mich.

W. E. Slaughter, Jr., *Pres.* H. E. Wenger, *V. P.* Max M. Fisher, *Sec.* C. S. Wenger, *Treas.* Max M. Fisher, *Sales Mgr.* Larry Curran, *Gen. Supt. Ref.* Harry Erickson, *Ch. Chem.* William E. Slaughter, Jr., *Pur. Agt.* I. R. Schiff, *Traf. Mgr.* Refineries located at Elsie, Mich., and Detroit, Mich.

B

Baird Refining Co., Baird, Tex.

J. R. Parten, *Chm. Bd.* Myron G. Blalock, *Pres.* J. R. Pope, *V. P.* R. P. Hargis, *Sec.* D. C. Biggers, *Treas.* E. E. Jackson, *Sales Mgr. Whse.* E. L. Woodley, *Sales Mgr., Retl.* Sylvester Dayson, *Gen. Mgr. Ref.* L. G. Dufilho, *Gen. Supt. Ref.* J. B. Misenheimer, *Process Supt.* J. E. Bullock, *Pur. Agt.* Refinery located at Baird, Tex.

Bair, F. M., Oil Co., Grand Ledge, Mich.

Floyd M. Bair, *Pres.* Blanche Bair, *Sec.* Refinery located at Grand Ledge, Mich.

Baker Petroleum Corp., Beneficial Life Bldg., Salt Lake City, Utah.

Refinery located at Virgin, Utah. (Is leased from the Diamond Oil Co.)

Barber Asphalt Corp., Barber, N. J.

J. E. Auten, *Pres.* Frank Seamans, *V. P.* E. R. Riter, *Sec.* F. J. Robertson, *Treas.* H. C. Hottel, *Sales Mgr. Whse.* Joseph Slutzker, *Gen. Mgr. Ref.* H. J. Fleischer, *Supt. Oil Ref.* Percy Palmer, *Supt. Asphalt Ref.* L. S. Schleck, *Asst. Supt. Oil Ref.* Howard V. Smith, *Mgr. R. and D.* H. C. Howell, *Ch. Chem.* R. A. Stone, *Ch. Engr.* A. J. Hollenbach, *Pur. Agt.* C. Holdsworth, *Traf. Mgr.* Refinery located at Barber Station, Perth Amboy, N. J.

Bareco Oil Co., Box 2009 (formerly Barnsdall Refining Corp.), Tulsa, Okla.

O. L. Cordell, *Pres.* G. F. Racette, *V. P.* E. R. Atwill, Jr., *Sec.* C. E. Votrian, *Treas.* G. F. Racette, *Sales Mgr.* O. L. Cordell, *Gen. Mgr. Ref.* F. S. Horne, *Ref. Supt., Barnsdall.* V. R. Oakley, *Ref. Supt., Wichita.* G. T. Granger, *Ref. Supt., Corpus Christi.* E. R. Wiles, *Asst. Supt., Barnsdall.* O. E. McClatchey, *Pur. Agt.* R. E. Stewart, *Traf. Mgr.* Refineries located at Wichita, Kans., Barnsdall, Okla., and Corpus Christi, Tex.

Basin Refining Co., P. O. Box 98, Aztec, N. M.

D. J. Lingenfelter, *Owner.* Charles Riecke, *Supt* Refinery located at Aztec, N. M.

Basin Oil Refining Co., Box 477, Centralia, Ill.

A. R. Matthews, *Pres.* L. B. Stableford, *V. P.* W. H. Rice, Jr., *Sec.-Treas.* C. L. Withers, *Gen. Supt. Ref.* C. W. McCormack, *Supt. Ref.* Refinery located at Centralia, Ill.

Bay Petroleum Corp., The, Box 857, Denver, Colo.

C. U. Bay, *Pres.* R. V. Rodman, *V. P.* Dent N. Hand, *Sec.* L. L. Leabo, M. C. Bradshaw, *Sales Mgrs.* W. R. Newman, *Gen. Supt. Ref.* C. O. Garbrecht, *Supt Ref., Denver.* R. R. Rankin, *Supt. Ref., Cheyenne* Carl Orrison, *Supt. Ref., McPherson.* Ray Ainsworth *Ch. Chem., Denver.* A. A. Vendetti, *Ch. Chem., Mc Pherson.* Jay L. Olvey, *Ch. Chem., Cheyenne.* Refineries located at Denver, Colo., McPherson, Kans., and Cheyenne, Wyo.

Bay Refining Corp., 212 Bearinger Bldg., Saginaw, Mich.

James C. Graves, *Pres.* Howard D. Atha, *V. P.* Edward Reiser, *V. P.* and *Gen. Mgr.* T. G. Caley, *Sec.-Treas.* Kenneth Patterson, *Sales Mgr.* Frank Tiernan, *Gen. Supt. Ref.* Refineries located at Bay City, Mich., and Saginaw, Mich.

Bayou State Oil Corp., Shreveport, La.

P. M. Brown, *Pres.* and *Gen. Mgr. Ref.* Sidney M. Cook, *V. P.* Frank M. Cook, *Sec.-Treas.* W. T. Leeper, *Sales Mgr.* H. J. Sheard, *Gen. Supt. Ref.* and *Ch. Chem.* T. N. Reed, *Ref. Supt.* and *Ch. Engr.* F. D. Coons, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Hosston, La.

Beacon Oil Ref. Co., Henderson, Tex.

T. P. Cannon, *Pres., Treas.* and *Gen. Mgr.* Mrs. Alice M. Roberts, *V. P.* T. A. Garnett, *Sec.* L. H. Barbee, *Gen. Supt. Ref.* Refinery located at Henderson, Tex.

Bears Den Refinery, Chester, Mont.

Refinery located at Chester, Mont.

Beck, G. T., Refinery, Box 348, Cody, Wyo.

G. T. Beck, Sr., *Owner.* Wilbert M. Taylor, *Ref. Supt.* G. T. Beck, Sr., *Pur. Agt.* Refinery located at Cody, Wyo.

Bell Oil & Gas Co., Nat'l Bank of Tulsa Bldg., Tulsa, Okla.

Samuel L. Lubell, *Pres.* Benedict I. Lubell, *V. P.* and *Treas.* I. Arthur Anson, *V. P.* and *Gen. Mgr. Ref.* M. Lloyd Freese, *V. P.* Ben. P. Piepgrass, *Sec.* L. H. Deatherage, *Sales Mgr. Whsle.* Allie Moore, *Gen. Supt. Ref.* B. F. Gilchrist, *P. L. Supt.* Grant Jarrell, *Ch. Chem.* Louis Mack, *Ch. Engr.* J. H. Naron, *Pur. Agt.* C. E. Cadieux, *Traf Mgr.* Refinery located at Grandfield, Okla.

Ben Franklin Refining Co., National Bank of Tulsa Bldg., Tulsa, Okla.

I. Arthur Anson, *Pres.* and *Gen. Mgr. Ref.* Benedict I. Lubell, *V. P.* and *Treas.* M. L. Freese, *V. P.* Ben P. Piepgrass, *Sec.* L. H. Deatherage, *Sales Mgr. Whsle.* E. S. Horner, *Gen. Supt. Ref.* R. L. Barnard, *P. L. Supt.* F. V. Clark, *Ch. Chem.* Louis Mack, *Ch. Engr.* J. H. Naron, *Pur. Agt.* C. E. Cadieux, *Traf. Mgr.* Refinery located at Ardmore, Okla.

Berry Asphalt Co., 1472 W. Seventy-sixth St., Chicago, Ill.

B. H. Roberts, *Pres.* H. B. Pullav, *V. P.* A. H. Anderson, *Treas.* H. B. Pullav, *Gen. Mgr. Ref.* A. T. Van Pelt, *Ref. Supt.* J. T. Clarke, *Ch. Chem.* J. W. Smith, *Ch. Engr.* J. W. Savage, *Pur. Agt.* W. H. Liechty, *Traf. Mgr.* Refinery located at Waterloo, Ark.

Berry, James B., Sons' Co., Inc., Quaker State Bldg., Oil City, Pa.

James D. Berry, *Pres.* S. Messer, Frank Berry, E. L. Cleaves, *V. P.s.* W. R. Reitz, *Sec.* Charles D. Berry, *Treas.* G. B. Hunter, *Gen. Supt. Ref.* Russell Buckham, *Ch. Chem.* Lee R. Forker, *Pur. Agt.* Harry Shoemaker, *Supt.* Refinery located at Oil City, Pa.

Big West Oil Co. of Montana, 617 Hutton Bldg., Spokane, Wash.

L. R. Hawley, *Chm. Bd.* and *Pres.* C. P. Lund, E. R. Northrop, *V. P.s.* J. E. Orr, *Sec.-Treas.* R. I. Kerr, *Sales Mgr.* George A. Engle, Kevin, Mont., *Gen. Mgr.*

L. J. Williams, Kevin, Mont., *Asst. Supt.* D. J. Mullady, Kevin, *Ch. Chem.* George A. Engle, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Kevin, Mont.

Black Gold Refining Co., Box 882, Oklahoma City, Okla.
R. G. Cocoanower, *Sec.-Treas., Gen. Mgr. Ref.*, and *Pur. Agt.* Ed Hardin, *Sales Mgr.* Frank Ballow, *Ref. Supt.* Homer West, *Asst. Supt.* Charles Rodgers, *Ch. Chem.* Refinery located at Oklahoma City, Okla.

Bradford Oil Refining Co., Box 197, Bradford, Pa.
E. R. Lederer, *Pres.* and *Gen. Mgr.* F. D. Korner, *V. P.* R. B. Sibley, *Sec.-Treas.* A. Pieritz, *Sales Mgr.* R. S. Bridier, *Ref. Supt.* J. N. Francis, *Ch. Chem.* Gervaise Flynn, *Ch. Engr.* J. Von Carlowitz, *Pur. Agt.* W. F. Jewell, *Traf. Mgr.* Refinery located at Foster Brook, Bradford, Pa.

Bradford Penn Refining Corp., Clarendon, Pa.
Forest D. Dorn, *Pres.* A. D. David, *V. P.* W. Frank Miller, *Sec.* R. J. Brennan, *Treas.* J. F. Baldwin, *Sales Mgr.* V. C. Burkhard, *Gen. Supt. Ref.* W. A. Johnston, *Ch. Chem.* S. L. Myer, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Clarendon, Pa.

Bradner, B. J., Receiver for Lake View Oil & Refining Co., 1123 Rowan Bldg., Los Angeles, Calif.
B. J. Bradner, *Receiver in Equity.* E. C. Perrizo, *Sales Mgr.* Charles Dower, *Gen. Supt. Ref.* F. T. Fisher, *Pur. Agt.* Refinery located at Maricopa, Calif.

Bridger Refinery, The, Bridger, Mont.
Herschal F. Best, *owner.* Refinery located at Bridger, Mont.

Bryson Pipe Line & Refining Co., Bryson, Tex.
O. R. Tipps, *Pres.* C. J. Bohner, *V. P.* Y. Lienauz, *Sec.-Treas.* Rex Young, *Sales Mgr.* and *Gen. Supt.* Clyde Hall, *Ref. Supt.* Glenn Bear, *Pur. Agt.* L. W. Yeager, *Traf. Mgr.* Refinery located at Bryson, Tex.

Bush, R. R., Oil Co., 2790 Cherry Ave., Long Beach, Calif.
R. R. Bush, *Chm. Bd.* and *Pres.* W. H. Morgan, *V. P.* Neil Ensch, *Sec.-Treas.* W. E. Snowden, *Sales Mgr., Gen. Mgr. Ref.*, and *Mgr. R. and D.* R. B. Rubottom, *Gen. Supt. Ref.* Stanley A. Blocher, *Ch. Chem.* R. W. Keener, *Pur. Agt.* Refinery located at Long Beach, Calif.

C

California Oil & Refining Co., 2400 Artesia Blvd., North Long Beach, Calif.
W. J. Ross, *Pres.* Elva Lindbloom, *Ref. Mgr.* Refinery located at North Long Beach, Calif.

Calumet Refining Co., 4323 S. Western Blvd., Chicago, Ill.
Van S. Welch, *Pres.* T. A. Telfer, *V. P.* and *Gen. Mgr.* R. S. Watt, *Sec.-Treas.* Carl Harris, *Ref. Supt.* R. F. Duncan, *Mgr. R. and D.* Refinery located at Chicago, Ill.

Caminol Co., Ltd., 112 W. Ninth St., Los Angeles, Calif.
C. B. Colby, *Pres.* R. E. Hines, *V. P.* W. B. Allen, *Sec.* C. C. Colby, *Treas.* J. M. McElwain, *Sales Mgr. Whlse.* Clifford Hancock, *Asst. Sec.* and *Sales Mgr. Retl.* R. C. Colvin, *Gen. Supt. Ref.* Martin Mueller, *Ref. Supt., Santa Fe Springs.* Verne Monson, *Ref. Supt., Hanford.* R. W. McCament, *Pur. Agt.* Refineries located at Santa Fe Springs, Calif., and Hanford, Calif.

Canfield Oil Co., The, Cleveland, Ohio
J. A. Jackson, *Pres.* H. M. Carruth, *V. P.* J. R. Nelson, *Sec.* A. L. Bailey, *Treas.* F. J. Van Bergen, *Asst. Sec.* Refineries located at Coraopolis, Pa.; Cleveland, Ohio.

Canton Refining Co., The, Gambrinus Road, P. O. Box 350, Canton, Ohio
W. E. Weidler, *Pres.* M. R. Wiseman, *V. P.* and *Sales Mgr.* R. S. Blazer, *Sec.* C. L. Wedell, *Gen. Supt. Ref.* R. K. Jones, W. B. Borst, *Asst. Supts.* Gene Murphy, *Ch. Chem.* C. L. Wedell, *Pur. Agt.* Refinery located at Canton, Ohio.

Capitol Crude Oil Co. of Los Angeles, 1020 Subway Terminal Bldg., Los Angeles, Calif.
E. P. Clark, *Pres.* A. E. Smith, *Sec.* Refinery located at Santa Paula, Calif.

Carpenter, Terry, Inc., Scottsbluff, Neb.
Terry Carpenter, *Pres.* Hazeldeane Carpenter, *V. P.* Martha Hillerege, *Sec.-Treas.* Don Hillerege, *Sales Mgr., Pur. Agt.*, and *Traf. Mgr.* Charles Glasby, *Gen. Mgr. Ref.* Joe Jinks, *Ref. Supt.* James Sutcliff, *Ch. Chem.* Refinery located at Scottsbluff, Neb.

Carroll, L. Ray, Petroleum Products, Roundup, Mont.
L. Ray Carroll, *Owner.* Refinery located at Roundup, Mont.

Centralia Refining Co., Box 464, Centralia, Ill.
A. F. Grohe, *Pres.* R. G. Matthews, *Sec.* and *Treas* and *Gen. Mgr. Ref.* Jack Stribling, *Gen. Supt. Ref.* Refinery located at Centralia, Ill.

Central Oil Co., Glasgow, Ky.
R. B. Tyler, *Pres.* S. C. Harlin, *Gen. Mgr.* Refinery located at Glasgow, Ky.

Century Oil Co., 1841 E. 29th St., Long Beach, Calif.
E. O. Bachmann, *Pres.* D. S. Jeppson, *V. P.* John G. Bachmann, *Sec.-Treas.* A. R. MacIntosh, *Sales Mgr.* Charles S. Cox, *Gen. Supt. Ref.* Refinery located at Signal Hill, Calif.

Chadron Refinery, Chadron, Neb.
Refinery located at Chadron, Neb.

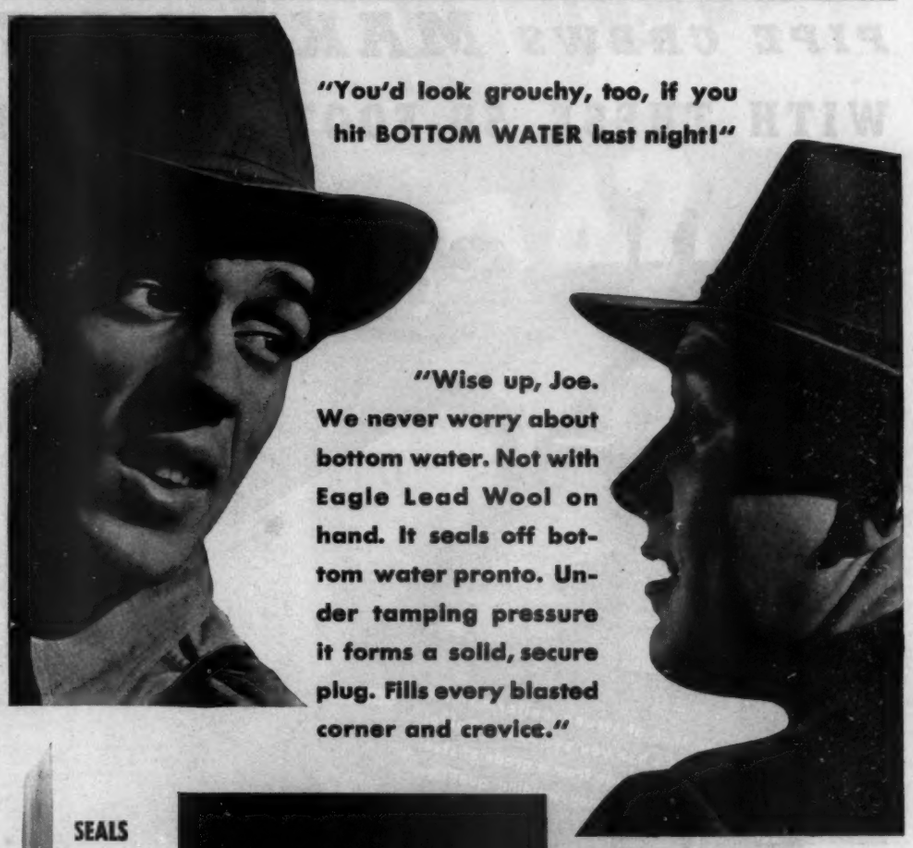
Chalmette Petroleum Corp., 1904 American Bank Bldg., New Orleans, La.
F. E. Holsten, *Exec. V. P.* L. E. Vivien, *Sec.-Treas.* H. LeGros, *Sales Mgr.* F. E. Holston, *Gen. Mgr. Ref.* J. C. Senter, *Ref. Supt.*, Chalmette. E. H. Long, *Asst. Supt.* and *Process Supt.* Kohlman Campell, *Ch. Chem.* E. J. Falgout, *Ch. Engr.* V. G. McPherson, *Pur. Agt.* J. W. Jemison, *Traf. Mgr.* Refinery located at Chalmette, La.

Champlin Refining Co., Enid, Okla.
H. H. Champlin, *Chm. Bd.* and *Pres.* Joe N. Champlin, *V. P.* D. W. Cotton, *Sec.-Treas.* L. A. Snyder, *Sales Mgr. Whsle.* A. H. Holland, *Sales Mgr. Retl.* H. H. Champlin, *Gen. Mgr. Ref.* E. J. Slater, *Gen. Supt. Ref.* L. E. Noble, *Pur. Agt.* W. J. Barnes, *Traf. Mgr.* Refinery located at Enid, Okla.

Chanute Refining Co., The, P. O. Box 431, Chanute, Kans.
Elmer M. Cooper, *Chm. Bd.* R. W. Lind, *Pres.* Elmer M. Cooper, *V. P.* and *Sales Mgr.* Ray M. Coder, *Sec.-Treas.* R. W. Lind, *Gen. Supt. Ref.* James M. Caldwell, *Ch. Chem.* Roscoe Young, *Ch. Engr.* Refinery located at Chanute, Kans.

C-H. Refinery, Lusk, Wyo.
James Mobbit, *Owner.* Refinery located at Lusk, Wyo.

Cities Service Oil Co. (Delaware), Bartlesville, Okla.
H. R. Straight, *Pres.* A. W. Ambrose, C. E. Murray, W. H. Merritt, H. D. Frueauff, *V. P.s.* C. E. Murray, *Sec.* Lloyd A. Lynd, *Asst. Treas.* O. J. Tuttle, *Ref. Sales Mgr.* C. A. Willis, *Mktg. Sales Mgr.* H. W. Camp, *Gen. Mgr. Ref.* L. D. Mann, *Gen Supt. Ref.* L. N. Haugen, *Ref. Supt., Ponca City.* E. H. Roy, *Ref. Supt., East Chicago.* C. O. Bailey, *Ref. Supt., Okmulgee.* D. V. Eells, *Asst. Supt. Ponca City.* J. D. Snakenberg, *Asst. Supt., East Chicago.* Neal B. Lau Bach, B. H. Mylius, and R. S. Ross, Ponca City; L. E. Taylor, J. A. Witherspoon, East Chicago, *Process Supts.* W. W. Scheumann, *Ch. Chem.* Clay Briggs, *Ch. Engr.* Harris Bateman, *Pur. Agt.* A. C. Holmes, *Traf. Mgr.* Refineries located at Ponca City, Okla., East Chicago, Ind., and Okmulgee, Okla.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Coastal Petroleum Corp., Mobile, Ala.

John T. Cochrane, Jr., *Pres.* George S. Cochrane, *V. P.* E. D. Shaffer, *Sec.-Treas.* R. K. Owen, *Ref. Supt.* Refinery located at Mobile, Ala.

Coastal Refineries, Inc., Taylor, Tex.

G. L. Rowsey, *Pres.* T. F. Murchison. Harris A. Melasky, *V. P.s.* Harris A. Melasky, *Sec.-Treas.* Dorothy West, *Asst. Sec.* W. R. Arrington, *Asst. Treas.* Neil Buckley, *Sales Mgr.* J. L. Sewell, *Gen. Mgr. Ref.* J. B. Mayo, *Ref. Supt.* J. J. Maurer, *Ch. Chem.* Refinery located at Port Isabel, Tex.

Coleman Refining Corp., P. O. Box 915, Coleman, Tex.

O. B. Stephens, *Chm. Bd.* Ray McGlothlin, *Pres.* and *Gen. Mgr.* C. I. Powell, *V. P.* M. C. Drummond, *Asst. Supt.* Refinery located at Coleman, Tex.

Colonial Beacon Oil Co., 30 Beacham St., Everett, Mass.

A. Clarke Bedford, *Pres.* L. E. Ulrope, D. M. Cox, *V. P.s.* J. C. Richdale, *V. P.* and *Sales Mgr.* A. F. Whiting, *Treas.* P. C. Shea, *Gen. Mgr. Ref.* W. Naden, *Gen. Supt. Ref.* J. F. Lyons, *Process Supt.* C. H. Cole, *Tech. Asst. to Gen. Mgr.* J. D. Lawler, *Ch. Chem.* H. L. Bolton, *Ch. Engr.* J. W. Casterton, *Pur. Agt.* A. G. Phelps, *Traf. Mgr.* Refinery located at Everett, Mass.

Cole Refining Co., 1180 E. Wardlow Road, Seal Beach, Calif.

Refinery located at Seal Beach, Calif.

Col-Tex Refining Co., 1000 Ramsey Tower, Oklahoma City, Okla.

L. H. Prichard, *Pres.* J. Steve Anderson, *V. P.* P. H. Anderson, *Sec.-Treas.* C. L. Mayhall, *Sales Mgr., refined oils.* C. H. Dresser, *Sales Mgr., asphalts* and *tech. naphthas.* George H. Burruss, *Gen Mgr. Ref.* Neal Prichard, *Ref. Supt.* B. I. Scoggin, *Mgr. R. and D.* M. H. Champion, *Traf. Mgr.* Refinery located at Colorado City, Tex.

Comet Oil Co., Ltd., 2906½ Cherry Ave., Long Beach, Calif.

William P. Andrews and Fred C. Davies, *Owners* and *Operators.* Refinery located at Long Beach, Calif.

Conewango Refining Co., 746-760 Market St., Warren, Pa.

Harry R. Lewis, *Pres.* C. L. McCarty, *V. P.* and *Asst. Sec.* M. J. Frazier, *Asst. Treas.* K. M. Lyons, *Sales Mgr.* W. L. Gettings, *Ref. Supt.* K. B. Brogan, *Asst. Ref. Supt.* R. E. Dunham, *Mgr. R. and D.* R. G. Crumley, *Ch. Chem.* Paul Broderick, *Pur. Agt.* M. F. Finley, *Traf. Mgr.* Refinery located at Warren, Pa.

Continental Oil Co., Ponca City, Okla.

Dan Moran, *Pres.* W. W. Bruce, W. H. Ferguson Walter Miller, G. F. Smith, R. E. Collom, Harry J. Kennedy, J. G. Dyer, *V. P.s.* James J. Cosgrove, *Sec.* G. F. Smith, *Treas.* Harry J. Kennedy, *V. P. chg. Sales.* Walter Miller, *V. P. chg. Mfg.* Harold G. Osborn, *Mfg. Mgr.* Fred G. Fellows, Ponca City; J. W. Brown, Baltimore; D. H. Hyler, Wichita Falls; Charles Morgan, Artesia; J. E. Fenex, Denver; H. H. Kinnaird, Albuquerque; J. A. Mann, Lewistown, *Ref. Supts.* J. O. Thoen, Ponca City; W. M. Cocke, Baltimore; J. A. Ramsey, Wichita Falls; L. L. Smith, Glenrock, *Asst. Supts.* B. H. Lincoln, *Ch. Chem.* M. E. Clawson, *Ch. Engr.* W. H. O'Connor, *Dir. of Pur.* P. H. Kuhns, *Traf. Mgr.* Refineries located at Ponca City, Okla.; Baltimore, Md.; Wichita Falls Tex.; Glenrock, Wyo.; Farmington, N. M.; Artesia, N. M.; Denver, Colo.; Albuquerque, N. M.; Lewistown, Mont.

Consumers Oil & Refining Co., Newcastle, Wyo.

P. N. Fortin, *Pres.* G. L. Culver, *V. P., Treas* and *Gen. Mgr. Ref.* L. B. Hancock, *Sec.* H. G. Martens, *Gen. Supt. Ref.* Refinery located at Newcastle, Wyo.

Continental Refining Co., Rouseville Road, Oil City, Pa.

T. A. Anderton, *Pres.* S. S. DeArman, *V. P.* M. DeArman, *Sec.* J. W. Anderton, *Treas.* C. H. Thomas, *Sales Mgr. Whsle.* H. M. Wiley, *Sales Mgr. Retl.* and *Pur. Agt.* W. J. Anderton, *Gen. Mgr. Ref.* E. F. Hanna, *Gen. Supt. Ref.* E. Pearson, *Ch. Chem.* J. C. Vogan, *Ch. Engr.* D. C. Hasson, *Traf. Mgr.* Refinery located at Oil City, Pa.

Cooperative Refinery Association, North Kansas City, Mo.

Howard A. Cowden, *Pres.* T. H. DeWitt, *V. P.* Clifford Miller, *Sec.* Homes Young, *Sales Mgr.* L. M. Johnston, *Gen Mgr. Ref.* Miles Cowden, *Asst. Supt Ref.* Vernon Lintner, *Pur. Agt.* N. L. Twelin, *Traf. Mgr.* Refinery located at Phillipsburg, Kans.

Cosco Oil Co., Electric Bldg., Fort Worth, Tex.

J. S. Cosden, *Pres.* and *Treas.* R. O. Wilson, *V. P.* and *Sales Mgr.* J. W. Lane, *Ch. Chem.* B. F. Young, *Pur. Agt.* Joe E. Ernest, *Supt.* Refinery located at Wynnewood, Okla.

Cosden Petroleum Corp., 1700 Electric Bldg., Fort Worth, Tex.

Henry Zweifel, *Pres.* Milton C. Zaidenberg, *V. P.* R. L. Tollett, *Sec.-Treas.* W. E. Gibson, *Sales Mgr.* E. W. Potter, *Gen. Mgr. Ref.* E. W. Potter, Big Spring; Maloy Stevenson, Graham, *Ref. Supts.* J. E. LeBleu, Big Spring; George Grimes, Graham, *Asst. Supts.* Harold Bottomley, *Ch. Chem.* Harry A. Brown, *Ch. Engr.* Ben C. Ammann, *Pur. Agt.* D. L. Orme, *Traf. Mgr.* Refineries located at Big Spring, Tex.; Graham, Tex.

Crook County Refinery, Sundance, Wyo.

A. Policky, *owner.* J. S. Policky, *Gen. Mgr. Ref.* Refinery located at Sundance, Wyo.

Cross, Henry H., Co., 122 S. Michigan Ave., Chicago, Ill.

George F. Fox, *Pres.* O. B. Bingham, Smackover, *Mgr.* N. R. Price, Smackover; D. L. Crandall, Colmar; J. L. McAndrew, Dupo, *Ref. Supts.* Henry H. Cross Co., *Pur. Agt.* Refineries located at Smackover, Ark.; Colmar, Ill.; Dupo, Ill.

Crown Central Petroleum Corp., American Bldg., Baltimore, Md.

Henry A. Rosenberg, *Pres.* H. S. Lane, *V. P.* James T-B. Bowles, *Sec.* S. K. Waters, *Treas.* Jesse Stickel, *Sales Mgr.* K. W. Shimeall, *Gen. Mgr. Ref.* R. S. Myers, *Ref. Supt.* David Hutchison, *Pur. Agt.* F. C. Clark, *Traf. Mgr.* Refinery located at Houston, Tex.

Crystal Refining Co. of Carson City, Inc., Carson City, Mich.

G. Fred Pratt, *Pres.* E. G. Guy, *V. P.* and *Gen. Mgr.* J. G. Fleckenstein, *V. P. chg. Sales.* M. A. Hagerman, *Sec.-Treas.* C. B. Johnson, *Gen. Supt. Ref.* William I. Chamberlin, Robert Hallett, *Ch. Chems.* Robert Hallett, *Elec. Ch. Engr.* M. A. Hagerman, *Pur. Agt.* E. G. Geller, *Traf. Mgr.* Refinery located at Carson City, Mich.

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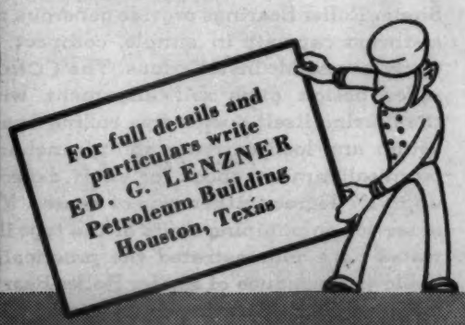

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HOUSTON·APRIL 11 TO 18, 1942

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Cut Bank Refining Co., Cut Bank, Mont.

Kenneth H. Davis, *Pres.* R. C. Tarrant, *V. P.* J. A. Strack, *Sec.-Treas.* Ray Searson, *Sales Mgr.* H. A. Lynn, *Gen. Supt. Ref.* Delbert L. Haynes, *Ch. Engr.* Refinery located at Cut Bank, Mont.

D

Danube Oil Corp., Amarillo, Tex.

Rip C. Underwood, *Pres.* R. E. Lantz, *Treas.* N. E. Schneider, *Sales Mgr., Gen. Mgr. Ref.*, and *Pur. Agt.* C. F. Streetman, *Ref. Supt.* E. L. Wilson, *Ch. Chem.* (Borger). Refinery located at Borger, Tex.

Daugherty Refinery, A Division of I. Sonneborn Sons, Inc., 88 Lexington Ave., New York, N. Y.

Dr. F. Sonneborn, *Pres.* J. F. Roten, *V. P.* R. G. Sonneborn, *Sec.* Max Pick, *Treas.* T. M. Murphy, *Mgr.* D. A. Schoerke, *Ch. Engr.* Dr. F. W. Breth, *Ch. Chem.* C. E. McGinnis, *Supt.* Refinery located at Petrolia, Pa.

Deep Rock Oil Corp., Atlas Life Bldg., Tulsa, Okla.

B. L. Majewski, *Sales Mgr.*, Chicago. W. E. Moody, *Mgr. Ref.*, Cushing. George Waltershausen, *Supt. Ref.*, Cushing. B. C. Frichot, *Ch. Chem.*, Cushing. R. G. Davis, *Ch. Engr.*, Cushing. R. G. Martin, *Pur. Agt.* H. R. Gillespie, *Traf. Mgr.*, Chicago. Refinery located at Cushing, Okla.

Deloraine Refining Co., Box F, Oilmont, Mont.

Henry Vander Pas, *Pres.* O. A. Nepstad, *V. P.* J. M. George, *Sec.-Treas.* J. L. Peyton, *Sales Mgr., Gen. Mgr. Ref.*, and *Pur. Agt.* P. O. Engen, *Gen. Supt. Ref.* and *Ch. Chem.* Refinery located at Oilmont, Mont.

Derby Oil Co., The, 352 N. Broadway, Wichita, Kans.

A. L. Derby, *Chm. Bd.* Carl Fisher, *Pres.* S. P. Wallingford, *V. P.* H. E. Zoller, *Exec. V. P.* and *Gen. Mgr.* F. W. McCurry, *V. P. chg. Ref.* E. Wasser, *Sec.* E. C. Claiborne, *Treas.* C. A. Keller, *Sales Mgr. Whlse.* H. S. Dickson, *Sales Mgr. Retl.* E. R. Jones, *Ref. Supt.* George Weber, *Asst. Supt.* Guy Proctor, *Pur. Agt.* H. G. Watts, *Traf. Mgr.* Refinery located at Wichita, Kans.

Diamond Oil Co., 414 Beneficial Life Bldg., Salt Lake City, Utah.

John Shewell, *Pres.* C. S. Martin, *V. P.* A. Hill, *Sec.* C. W. Buskirk, *Ch. Engr.* Refinery located at Virgin, Utah. (Leased to the Baker Petroleum Corp.)

Dilger, F. G., New Castle, Wyo.

F. G. Dilger, *Owner.* Refinery located at Newcastle, Wyo.

E

Eagle Oil & Refining Co., P. O. Box 763, Santa Fe Springs, Calif.

Harvey T. Nelson, *Pres.* J. D. Sterling, *Sales. Mgr.* Refinery located at Santa Fe Springs, Calif.

Eason Oil Co., Enid, Okla.

T. T. Eason, *Pres.* L. D. Hinman, *V. P.* T. W. Eason, *Sec.-Treas.* R. H. Rowland, *Sales Mgr. Whsle.* Vic Puber, *Sales Mgr., Retl.* P. G. Maranville, *Gen. Mgr.* G. B. Lyons, *Ch. Chem.* W. H. Taft, *Ch. Engr.* A. C Hatton, *Pur. Agt.* H. A. Meyers, *Traf. Mgr.* Refinery located at Enid, Okla.

Eastern States Petroleum Co., Inc., 617 Caroline, Houston, Tex., and 630 Fifth Ave., New York, N. Y.

R. B. Kahle, *Chm. Bd.* and *Pres. J.* F. McCarthy, *V. P.* and *Sec.* D. W. Armstrong, *V. P.* and *Treas.* L. J. Walsh, *V. P.* B. F. Fallon, *V. P., Sales Mgr.*, and *Gen. Supt. Ref.* R. Q. Traweek, *Ref. Supt.* P. A. Kahle, *Asst. Supt.* J. G. Boyle, *Proc. Supt.* E. W. Patterson, *Ch. Chem.* J. G. Nelson, *Ch. Engr.* G. I. Lewis, *Traf. Mgr.* J. J. Fallon, *Pur. Agt.* Refinery located at Manchester Road, Houston, Tex.

East Texas Refining Co., Tower Petroleum Bldg., Dallas, Tex.

F. W. Burford, *Pres.* John J. Thomas, C. C. Herndon, *V. Ps.* W. K. Cottrell, *Sec.* and *Treas.* John J. Thomas, *Gen. Mgr. Ref.* H. H. Knoch, *Ref. Supt.* Milton Hardy, *Ch. Chem.* N. G. Conley, *Ch. Engr.* W. M. Bisett, *Pur. Agt.* Refineries located at Longview, Tex., and Rodessa, La.

East-West Refining Co., 1815 S. Soto St., Los Angeles, Calif.

Bernard F. Alfs, *Pres.* and *Sales Mgr. Whsle.* R. W. Norton, *Sec., Sales Mgr., Retl.* E. B. Lay, *Gen. Supt.* Refinery located at Los Angeles, Calif.

Egyptian Producing & Refining Co., P. O. Box 341, Centralia, Ill.

Perry T. Fess, *Pres.* John Peters, *V. P.* and *Ref. Supt.* L. L. Urquhart, *Sec.-Treas., Pur. Agt.*, and *Gen. Mgr.* S. P. Grady, *Ch. Chem.* Russell Huffman, *Ch. Engr.* Refinery located at Centralia, Ill.

El Camino Refining Co., 3970 Medford St., Los Angeles, Calif.

H. A. Meek, *Pres.* J. Vernon Pohl, *V. P.* and *Sales Mgr.* E. G. Whitehead, *Sec.* B. E. Devere, *Treas.* and *Gen. Mgr. Ref.* Glen Coiner, *Gen. Supt. Ref.* W. L. Morris, *Asst. Supt.* Refinery located at Los Alamitos, Calif.

El Dorado Refining Co., Eldorado, Kans.

Charles G. Yankey, *Pres.* Robert H. Bradford, *V. P.* and *Treas.* T. A. Helling, *V. P.* and *Gen. Mgr.* George J. Peterschmidt, *Sec.* C. W. Rice, *Sales Mgr.* G. C. Anderson, *Gen. Supt.* H. J. Datin, *Asst. Supt.* Everett Leonard, *Mgr. R. and D.* D. N. Boone, *Ch. Chem.* O. G. Jackson, *Pur. Agt.* R. E. Fisher, *Traf. Mgr.* Refinery located at Eldorado, Kans.

Elk Horn Refinery, Osage, Wyo.

Clara K. Dornocher, *Owner.* Joseph F. Dornocher, *Mgr.* Refinery located at Osage, Wyo.

Elk Refining Co., Kanawha Valley Bldg., Charleston, W. Va.

H. A. Logan, *Chm. Bd.* and *Pres.* F. G. Bannerot, *V. P., Treas.* F. G. Bannerot, Jr., *V. P.* and *Sec.* R. D. Lowe, *Sales Mgr., Whsle.* J. W. Wright, *Sales Mgr., Retl.* Robert Burr, *Gen. Supt. Ref.* C. J. Hesch. C. E. Kirk, *Asst. Supts.* F. A. Nicholson, *Ch. Chem.* L. K. Forthman, *Pur. Agt.* C. J. Harner, *Traf. Mgr.* C. E. Kirk, *Ch. Engr.* Refinery located at Falling Rock, W. Va.

Elm Oil Co., 3328 Elm Ave., Long Beach, Calif.

F. Steiner, *Pres.* and *Gen. Supt. Ref.* G. Kindseth, *Sec.-Treas., Gen. Mgr.* A. G. Goedde, *Ch. Chem.* J. A. Novelli, *Pur. Agt.* Refinery located at Long Beach, Calif.

El Tejon Oil & Refining Corp., P. O. Box 546, Bakersfield, Calif.

Gould M. Fitch, *Pres.* Walter J. Meyers, *V. P.* and *Sales Mgr.* George W. Gill, Jr., *Sec.-Treas.* Joe D. Weedon, *Gen. Mgr.* Byron G. Adams, *Ch. Chem.* George W. Gill, Jr., *Ch. Engr.* and *Pur. Agt.* Refinery located at Bakersfield (Mount View area), Calif.

Envoy Petroleum Co., 3000 Walnut Ave., Long Beach, Calif.

A. M. Lockhart, *Pres.* and *Treas.* H. J. Witz, *V. P.* and *Gen. Mgr.* W. S. Wilsey, *Sec.* and *Pur. Agt.*

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Evansville Oil Corp., 613 Giddens Lane Bldg., Shreveport, La.

J. P. Evans, *Pres.* Jack Coast, *V. P.* H. R. Scivally, *Sec.-Treas.* Claude Burson, *Ref. Supt.* J. S. Wise, *Sales Mgr.* Refinery located at Cotton Valley, La

Exeter Refining Co., 5843 Paramount Blvd., Long Beach, Calif.

Carl von Bibra, *Pres.* Earle F. Demond, *V. P.* and *Treas.* Harold E. Thomas, *Sec.* N. F. Gallucci, *Mgr. Ref.* J. J. Klein, *Ch. Chem.* Refinery located at Long Beach, Calif.

F

Fairfield Refining Corp., Drawer 71, Fairfield, Ill.

J. S. Schurman, *Pres.* R. N. McNeilly, *V. P.* A. H. Eisler, *Sec.-Treas.* G. H. Stierwalt, *Sales Mgr.* R. B. Knight, *Gen. Mgr. Ref.* P. A. Sneed, *Gen. Supt. Ref.* N. Balai, *Ch. Chem.* R. B. Knight, *Pur. Agt.* R. S. Vertrees, *Traf. Mgr.* Refinery located at Fairfield, Ill.

Falcon Refining Co., The, Box 773, Great Bend, Kans.

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Falls Ref. Co., Inc., P. O. Box 508, Wichita Falls, Tex.

Mark T. Cannon, *Gen. Mgr.* Refinery located at Wichita Falls, Tex.

Five C Refining Co., 1219 Transamerica Bldg., Los Angeles, Calif.

G. H. Cherry, *Pres.* John G. Cherry, *V. P.* Guy H. Cherry, Jr., *Sec.-Treas.* H. G. Phillips, *Sales Mgr* Guy H. Cherry, Jr., *Gen. Mgr. Ref.* D. M. Prentice, *Gen. Supt. Ref.* Walker Steavenson, *Ch. Chem.* Marvin Tognazzine, *Traf. Mgr.* Refinery located at Santa Maria, Calif.

Fletcher Oil Co., Inc., 530 W. Sixth St., Los Angeles, Calif.

D. S. Fletcher, *Pres.* F. O. Fletcher, *V. P.* A. R. Hudgins, *Sec.-Treas.* O. H. Muller, Jr., *Sales Mgr.* John F. Lynch, *Gen. Supt. Ref.* L. A. Hulsey, *Asst. Supt.* Joseph F. Wonder, *Ch. Chem.* Refinery located at Wilmington, Calif.

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Rae W. Lewis, *Pres.* Fred A. Carlson, *V. P.* A. B. Wiggins, *Sec.-Treas.* Max J. Lewis, *Sales Mgr.* Harry B. Crell, *Gen. Mgr. Ref.* Refinery located at Bloomingdale, Mich.

Franklin Creek Refining Corp., 88 Lexington Ave., New York, N. Y.

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Fredonia Oil & Refining Co., P. O. Box 63, Fredonia, Kans.

D. W. Crumley, Chanute, Kans., *Pres.* Mrs. Helen Daugherty, Topeka, Kans., *V. P.* Raymond Justice, *Sec.* and *Gen. Mgr.* Ira Dozier, *Gen. Supt.* Refinery located at Fredonia, Kans.

Freedom Oil Co., Freedom, Pa.

Earle M. Craig, *Pres.* William G. Bechman, R. B. McKee, *V. P.s.* William G. Bechman, *Sec.* Earle M. Craig, *Treas.* R. B. McKee, *Sales Mgr., Whse.* E. N. McDonald, *Sales Mgr., Retl.* B. L. Heath, *Gen. Supt. Ref.* A. M. Crittenden, *Ch. Chem.* C. J. Mohr, *Pur Agt.* H. L. Wissner, *Traf. Mgr.* Refinery located at Freedom, Pa.

Frontier Fuel Oil Corp., Buffalo, N. Y.

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G

Gallatin Valley Co-Operative Co., Belgrade, Mont.

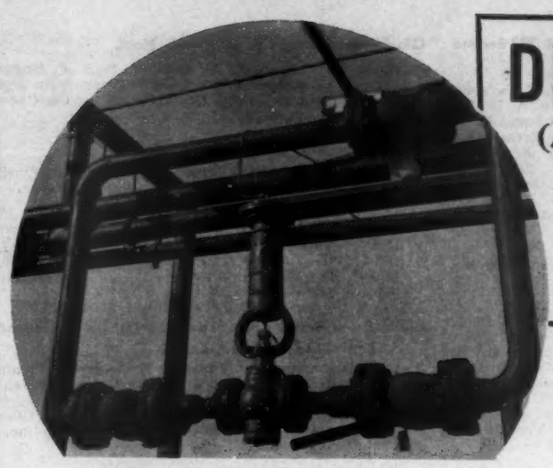
Refinery located at Belgrade, Mont.

Gallup City Refinery, Gallup City, Mont.

Refinery located at Gallup City, Mont.

Garvanza Oil Co., Inc., Santa Maria, Calif.

Refinery located at Santa Maria, Calif.



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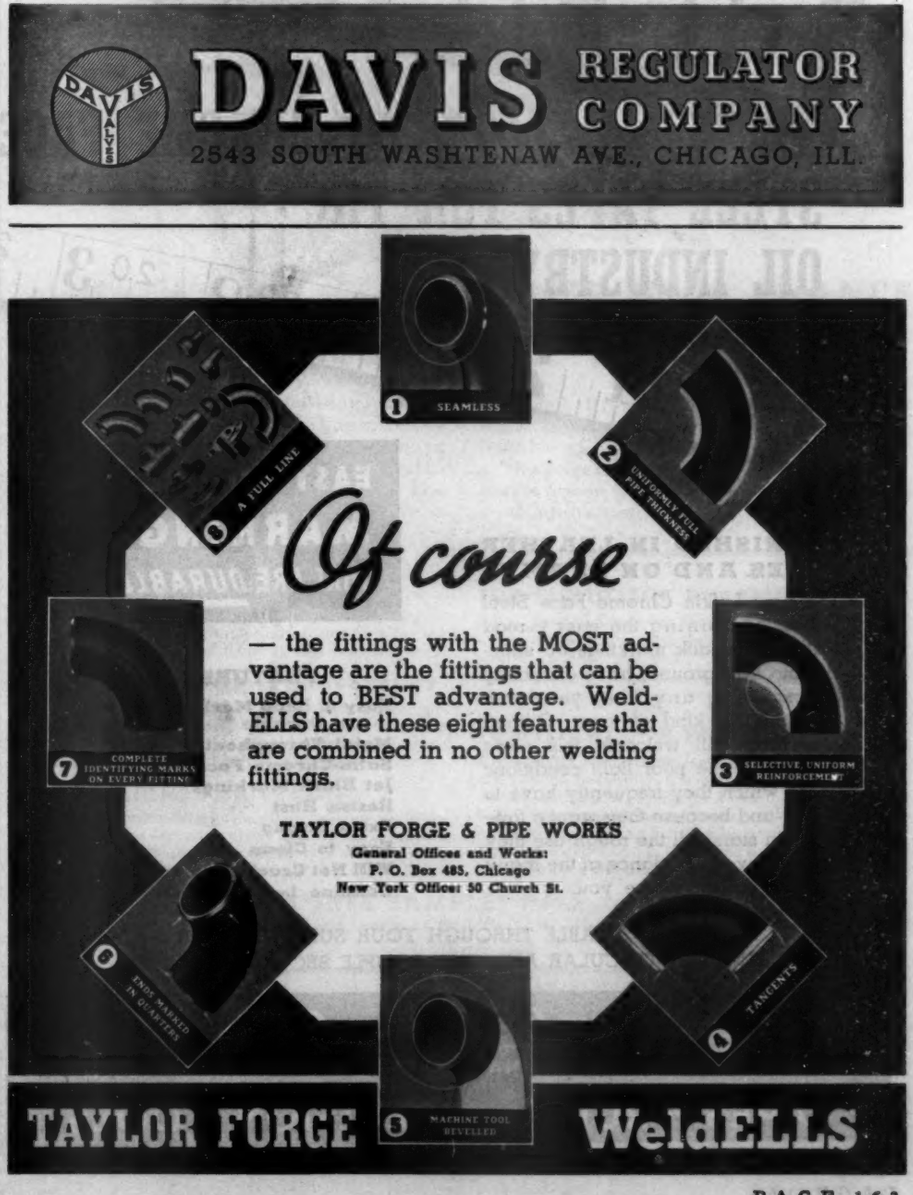
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Gladewater Ref. Co., Gladewater, Tex.

Refinery located at Kilgore, Tex. (Leased to Lynch Ref. Co.)

Glenco Refining Co., Bloomingdale, Mich.

H. G. Caldwell, *Pres.* H. C. Eastman, *V. P.* E. Brown, *Sec.-Treas.* H. G. Caldwell, *Sales Mgr.* W. W. Baize, *Gen. Supt. Ref.* Refinery located at Bloomingdale, Mich.

Globe Oil & Refining Co., The (Illinois), Union National Bank Bldg., Wichita, Kans.

I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and *Gen. Mgr. Ref.* G. G. Woodruff, *Sec.-Treas.* and *Sales Mgr.* H. B. Overton, *Ref. Supt.*, Lemont. W. F. Krause, *Ch. Chem.* R. A. Fox, *Ch. Engr.* H. B. Overton, *Pur. Agt.* E. R. Walcher, *Traf. Mgr.* Refinery located at Lemont, Ill.

Globe Oil & Refining Co., The (Kansas), Union National Bank Bldg., Wichita, Kans.

I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and *Gen. Mgr. Ref.* J. F. O'Shaughnessy, *Sec.-Treas.* E. A. Landsittel, *Sales Mgr.* E. J. Mary, *Ref. Supt.* and *Pur. Agt.*, McPherson. C. R. Berger, *Ch. Chem.* E. R. Walcher, *Traf. Mgr.* Refinery located at McPherson, Kans.

Globe Oil & Refining Co., The (Oklahoma), Union National Bank Bldg., Wichita, Kans.

I. A. O'Shaughnessy, *Pres.* F. L. Jehle, *V. P.* and *Gen. Mgr.* E. A. Lentz, *Sec.-Treas.* A. E. Landsittel, *Sales Mgr.* Refinery located at Blackwell, Okla.

Golden Bear Oil Co., 325 W. Eighth St., Los Angeles, Calif.

S. R. Roseberg, *Chm. Bd.*, J. M. Feldman, *Pres.* and *Sales Mgr.* Charles P. Prewett, *V. P., Gen. Mgr. Ref.*, and *Pur. Agt.* Louis L. Swarthe, *Sec.-Treas.* M. B.

Gordon Refining Co., Gordon, Neb.

William F. Hewett, *Owner*, Kenneth French, *Gen. Mgr. Ref.* Refinery located at Gordon, Neb.

Gramps Oil & Refining Corp., 616 Majestic Bldg., Denver, Colo.

Gerald Hughes, *Chm. Bd.* Lafayette M. Hughes, *Pres.* Charles J. Hughes, *V. P.* and *Sec.* William E. Hughes, *V. P.* and *Treas* Lafayette M. Hughes, Jr., *V. P.* Frank E. Shelly, *Gen. Mgr. Ref.* R. E. McCarty, *Ref. Supt.* J. Barley, *Ch. Chem.* Refinery located at Alamosa, Colo.

Gulf Oil Corp.-Gulf Refining Co., P. O. Box 1166, Pittsburgh, Pa.

W. L. Mellon, *Chm. Bd.* (Gulf Oil Corp.). F. A. Leovy, *Chm. Bd.* (Gulf Refining Co.) and *V. Chm. Bd.* (Gulf Oil Corp.). J. F. Drake, *Pres.* E. C. Bothwell, W. V. Hartmann, William A. Slater, *V. Ps.* H. A. Gidney, *V. P.* and *Comptroller.* David Proctor, *Sec.* J. E. Nalson, *V. P.* and *Treas.* T. J. Sullivan, *Gen. Mgr. Ref.* C. M. Gile and H. C. Meyer, *Gen. Mgrs. Refined Oil Sales.* R. M. Bartlett, *Gen. Mgr. Fuel Oil Sales.* H. P. Hobart, *Gen. Mgr. Lub. Oil Sales.* Herbert Henderson, *Mgr. Engin. and Constr.* H. G. Smith, *Mgr. Ref. Tech. Div.* Donald G. Clark, *Dir. of Pur.* A. J. Bessolo, *Traf. Mgr.* B. H. Barnes, *Gen. Supt. in Tex., Port Arthur.* H. Taylor, Fort Worth: J. W. Schriever, Sweetwater; H. V. Sanderson (*Mgr.*), Staten Island; William H. Braybrooks, Staten Island; W. M. Crockett, Philadelphia; J. O. Timms, Pittsburgh; D. E. Hart, Toledo; Thomas J. Twomey, Cleves, *Supts.* G. I. Roberts *(Asst. Gen. Supt.)*; R. C. Faulkner (*Asst. Gen. Supt.*), Port Arthur; Charles R. Stevenson (*Plant Mgr.*), Port Arthur; J. E. Biggins, R. S. Crockett, and R. C. Roether, Philadelphia; J. H. Wackenhut, Pittsburgh; C. R. Summers, Jr., Toledo; A. A. Niehenke, Cleves, *Asst. Supts.* Refineries located at Port Arthur, Tex.; Fort Worth, Tex.; Sweetwater, Tex.; Staten Island, N. Y.; Philadelphia, Pa.; Pittsburgh, Pa.; Toledo, Ohio, and Cleves, Ohio.

H

Harbor Refining Co., Inc., 2240 South St., Long Beach, Calif.

H. A. McOwen, *Pres.* and *Gen. Mgr.* D. D. Dunlap, O. M. Slosson, *V. Ps.* C. E. Duke, *Sec.* Harold Beckley, *Gen. Supt. Ref.* Refinery located at Long Beach, Calif.

Hancock Oil Co. of California, The, P. O. Box 810, Long Beach, Calif.

Will J. Reid, *Pres.* G. P. Deane, *V. P.* E. E. Pyles, *V. P. Prod.* John W. Hancock, *Sec.* W. T. Hancock, *Treas., Gen. Supt.* and *Mgr. R. and D.* C. B. Limbocker, *Sales Mgr.* H. S. Holloway, *Mgr. Fuel Oil and Marine Sales.* H. T. Boehme, *Ref. Supt.* and *Ch. Engr.* James Edwards, H. C. Burney, John Betts, Joe Murray, *Asst. Supts.* F. L. Smith, *Ch. Chem.* W. Westergard, *Pur. Agt.* H. T. McComb, *Traf. Mgr.* Refinery located at Long Beach, Calif.

Hawley, Ted, Conrad, Mont.

Owned and operated by Ted Hawley. Refinery located at Conrad, Mont.

Heffington Petroleum Co., P. O. Box 942, Austin, Tex.

Steve Heffington, Jr., *owner.* A. J. Allen, *Ref. Supt.* Refinery located at Austin, Tex.

Hole Bros. Refinery, Cut Bank, Mont.

B. V. Hole, Sr., and S. A. Hole, *Partners.* B. V. Hole, Sr., *Sales Mgr.* S. A. Hole, *Gen. Mgr. Ref.* and *Pur. Agt.* I. M. Hole, *Gen. Supt. Ref.* Refinery located at Cut Bank, Mont.

Home Oil & Refining Co., Great Falls, Mont.

W. E. Rice, *Pres.* W. E. Rice, Jr., *Sales Mgr., Retl.* John Rice, *V. P., Sales Mgr., Whsle.*, and *Gen. Mgr. Ref.* Fred Erickson, *Sec.-Treas.* and *Pur. Agt.* Garrett Hoback, *Gen. Supt., Ref. Supt., Great Falls.* Carl Woods, *Ref. Supt., Conrad.* Vernon May, *Ch. Chem.* Marvin Jenkins, *Ch. Engr.* Frank Fogarty, *Traf. Mgr.* Refineries located at Great Falls, Mont., and Conrad, Mont.

Houston Oil Co. of Texas, Houston, Tex.

T. S. Maffitt, *Chm. Bd.* George A. Hill, Jr., *Pres* L. S. Zimmerman, *V. P.* and *Treas.* A. H. Kennerly

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Hot Springs Refining Co., Hot Springs, S. D.

E. M. Wells, *Pres.* and *Sales Mgr.* E. M. Foster, *V. P.* C. M. Wells, *Sec.-Treas.* Refinery located at Hot Springs, S. D.

Howard County Refining Co., Big Spring, Tex.

R. T. Piner, *Pres.* Joseph Edwards, *V. P.* and *Gen. Mgr. Ref.* G. H. Hayward, *Sec.* and *Treas.* Seth Wehunt, *Ref. Supt.* J. Henry Edwards, *Sales Mgr.* and *Pur. Agt.* Refinery located at Big Spring, Tex.

Humble Oil & Refining Co., P. O. Box 2180, Houston, Tex.

R. L. Blaffer, *Chm. Bd.* H. C. Wiess, *Pres.* James Anderson, E. E. Townes, John R. Suman, L. T. Barrow, *V. P.s.* H. H. Baker, Stuart A. Giraud, *Additional Dirs.* James S. Crate, *Sec.* R. L. Blaffer, *Treas.* Stuart A. Giraud, *Mgr. Sales.* M. J. Monroe, *Sales Mgr. Whsle.* D. T. Monroe, *Sales Mgr. Retl.* Stuart A. Giraud, *Gen. Mgr. Ref.* H. W. Ferguson, *Asst. Gen. Mgr. Ref.* E. Voss, *Mgr. Ref. Oper.* G. L. Farned, Baytown; H. F. Goss, Ingleside; C. M. Bell, San Antonio; C. M. Dennison, Neches, *Ref. Supts.* James Harrop, Baytown; W. H. Barber, Ingleside; E. H. Seeley, San Antonio, *Asst. Ref. Supts.* M. L. Snyder, *Process Supt.*, Baytown, H. D. Wilde, Jr., *Mgr. Tech. and Research Depts.* S. S. Shaffer, *Head Research and Lab. Div.* W. F. White, *Head Tech. Service.* R. S. Clark, *Process Engin. Design.* H. F. Hartman, *Mech. Engin. Design.* F. A. Watts, *Pur. Agt.* C. H. McNair, *Traf. Mgr.* Refineries located at Baytown, Tex.; Ingleside, Tex.; San Antonio, Tex.; Neches, Tex.

Hunt, Eugene, Lewiston, Mont.

Eugene Hunt, *Sales Mgr.* Ed Korwald, *Gen. Mgr.* Refinery located at Winnett, Mont.

Hurricane Petroleum Corp., First National Bank Bldg., Shreveport, La.

August Ulrich, *Chm. Bd.* M. J. Grogan, *Pres.* J. E. Marshall, *V. P.* H. T. McGown, *Sec.* T. H. Grobe, *Treas.* W. F. Kostelka, *Sales Mgr.* J. A. O'Neil, *Gen. Mgr. Ref.* J. W. Jordan, *Ref. Supt., Overton* and *Arp.* J. R. Cox, *Ch. Chem.* O. F. Shaver, *Pur. Agt.* C. C. Correll, *Traf. Mgr.* Refineries located at Overton and Arp, Tex.

Husky Refining Co., Cody, Wyo.

Glenn E. Nielson, *Pres.* Charles Baker, *V. P.* Roland F. Cowley, *Sec.* James H. Shepard, *Gen. Supt. Ref.* John B. Kimes, *Ref. Supt.* Kenneth E. Dyer, *Ch. Chem.*

I

Idaho Refining Co., Pocatello, Idaho

Gilbert S. Sheets, *Chm. Bd.* and *Pres.* Henry D. Moyle, *V. P.* Arch G. Webb, *Sec.* John H. Peterson, *Treas.* Gilbert D. Moyle, *Sales Mgr.* and *Gen. Mgr. Ref.* Don F. Gerstenberger, *Gen. Supt. Ref.* G. L. Farnsworth, *Ch. Chem.* Arch G. Webb, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Pocatello, Idaho.

Illinois Oil Co., Rock Island, Ill.

F. P. Welch, *Pres.* J. W. Armstrong, J. G. Huntoon, *V. P.s.* F. R. Edwards, *Sec.-Treas.* E. F. Donnelly, *Sales Mgr., Whsle.* J. C. Rudy, *Sales Mgr., Retl.* P. J. Glover, *Gen. Mgr. Ref.* and *Traf. Mgr.* W. W. Kelley, *Gen. Supt. Ref.* F. R. Edwards, *Pur. Agt.* Refinery located at Cushing, Okla.

Imperial Refining Co., P. O. Box 104, Grand Rapids, Mich.

Wallace Gilroy, *Pres.* A. F. Hickey, *V. P.* S. W. Judd, *Sec.-Treas.* A. F. Hickey, *Sales Mgr.* Glenn Hobson, *Ref. Supt., Dewey.* J. A. Crawford, *Ref. Supt., Grandville.* Barton Kline, *Ch. Chem.* Richard Timmer, *Traf. Mgr.* Refineries located at Dewey, Mich., and Grandville, Mich.

Independent Refining Co., Laurel, Mont.

W. E. Rice, *Pres.* D. E. Hageman, *V. P.* F. H. Hietzhausen, *Sec.-Treas.* C. A. Cromwell, *Ref. Supt.* J. M Williams, *Ch. Chem.* W. H. Tolhurst, *Ch. Engr.* P. A. Thompson, *Sales Mgr., Pur. Agt.* and *Traf. Mgr.* O. N. Vadnais, Harold Williams, *Process Supts.* Refinery located at Laurel, Mont.

Independent Refining Co. of Michigan (subsidiary of Inter-Lakes Refining Co.), Flat Rock, Mich.

West H. Gallogly, *Pres.* Thomas L. Lott, *V. P.* Edward H. Yost, *Sec.* Roland O'Neil, *Treas.* and *Pur. Agt.* West H. Gallogly, *Gen. Mgr. Ref.* James T. Pokorney, *Gen. Supt. Ref.* and *Ch. Chem.* Refinery located at Flat Rock, Mich.

Independent Ref. Co., Peoples Nat'l Bank Bldg., Tyler, Tex.

Partnership: W. R. Skeen, Joe B. Skeen, A. L. Skeen, Ecta Walters, Ben T. Parish, F. O. Penn, and C. W. Curtis. C. Zimmerman, *Ref. Supt.* Refinery located at Arp, Tex.

Indian Refining Co. (subsidiary of Texas Corp.), Lawrenceville, Ill.

W. S. S. Rodgers, New York City, *Pres.* J. S. Worden, H. W. Dodge, New York City; W. Hochuli, Chicago; C. E. Olmsted, New York City; S. B. Wright, New York City, *V. P.s.* R. L. Saunders, New York City, *Sec.* L. H. Lindeman, New York City, *Treas.* C. E. Olmsted, New York City, *V. P. chg. Ref.* W. B. Logan, *Supt. Ref.* W. F. Moore, New York City, *Mgr. Pur. Dept.* Refinery located at Lawrenceville, Ill.

Indiana Farm Bureau Cooperative Association, Inc., Mount Vernon, Ind.

James Cummins, *Chm. Bd.* and *Pres.* Everett Jeanes, *Sec.* M. J. Briggs, *Treas.* I. H. Hull, *Gen. Mgr.* Ralph Booker, *Gen. Mgr. Ref.* Russell J. Potts, *Gen. Supt. Ref.* Herbert A. Guy, *Ch. Chem.* Lawrence Hays *Traf. Mgr.* Refinery located at Mount Vernon, Ind

Industrial Oil & Refining Co., 8640 Rheems Ave., Southgate, Calif.

L. E. Allen, *Owner.* D. H. Chapman, *Ref. Mgr.* Refinery located at Southgate, Calif.

Inland Empire Refineries, Inc., P. O. Box 6188, Hillyard Station, Spokane, Wash.

William H. McIntyre, Jr., *Pres.* Henry D. Moyle, *V. P.* D. S. Bennion, *Sec.* W. J. Doherty, *Asst. Treas* D. F. Gerstenberger, *Gen. Mgr. Ref.* A. G. Coppins, *Ref. Supt.* R. O. Gleave, *Ch. Chem.* Refinery located at Spokane, Wash.

Interstate Oil Corp., Taft, Calif.

F. B. Gormley, *Receiver.* Refinery located at Taft, Calif.

J

Jacksboro Refining Co., Jacksboro, Mich.

F. W. Kendrick and A. T. Gray, *Owners.* Refinery located at Jacksboro, Tex.

Johnson Oil Refining Co., 20 N. Wacker Drive, Chicago, Ill.

James J. Johnson, *Chm. Bd.* I. H. Johnson, *Pres.* L. Ralph Johnson, *V. P.* G. C. Lilly, *Sec.* J. O. Horton, *Treas.* H. G. Plane, *Sales Mgr., Whsle.* M. C. Hill, *Sales Mgr., Retl.* L. Ralph Johnson, *Gen. Mgr. Ref.* W. J. Leenhouts, *Ref. Supt.* R. B. Fowler, *Process Supt.* F. V. Frey, *Ch. Chem.* V. C. Goward, *Pur. Agt.* G. A. Mindeman, *Traf. Mgr.* Refinery located at Cleveland, Okla.

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Johnson, A. L., Wayne, Ohio
A. L. Johnson, *owner*. Refinery located at Wayne, Ohio.

Johnson Oil Supply, P. O. Box 239, Gary, Ind.
Harold Johnson, Gerald Johnson, Tom Johnson (*Partnership*). L. A. Rountree, *Gen. Supt. Ref.* Gerald Johnson, *Ch. Chem.* L. A. Rountree, *Ch. Engr.* Harold Johnson, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Gary, Ind.

Joplin Refining Co., Joplin, Mo.
Joseph F. Jones, *Gen. Mgr. Ref.* Richard O'D. Jones, *Gen. Supt. Ref.* K. N. Roe, *Asst. Supt.* Refinery located at Joplin, Mo.

K

Kanotex Refining Co., Arkansas City, Kans.
C. M. Boggs, *Pres.* W. L. Lesh, *V. P.* and *Sales Mgr.* E. K. Childers, *Sec.* R. R. Cox, *Treas.* F. A. Deering, *Ref. Supt.* D. R. Patterson, Jr., *Ch. Chem.* Dodson Givens, *Ch. Engr.* L. E. Watts, *Pur. Agt.* C. E. Varner, *Traf. Mgr.* Refinery located at Arkansas City, Kans.

Kendall Ref. Co., P. O. Box 364, Bradford, Pa.
Otto Koch, *Pres.* and *Treas.* Joseph H. Bovaird, *V. P.* J. B. Fisher, *Exec. V. P.* and *Sec.* T. O. Grisell, *Sales Mgr. Branded Lube Oil & Greases.* R. A. Keck, *Sales Mgr. Branded Gasoline.* J. B. Fisher, *Sales Mgr. other products.* E. E. Brown, *Ref. Mgr.* W. B. McCluer, *Mfg. Supt.* E. J. Healy, *Ref. Supt. Dewaxing & Deresining Plant.* E. V. Kelly, *Ref. Supt. Distillation & Cracking.* W. B. McCluer, *Mgr. R. & D.* and *Ch. Chem.* S. M. Wolbert, *Ch. Engr.* F. W. Wodrich, Jr., *Pur. Agt.* Jas. S. White, Jr., *Traf. Mgr.* Refinery located at Bradford, Pa.

Kern Oil Co., Ltd., 354 S. Spring St., Los Angeles, Calif.
R. W. Stephens, *Chm. Bd.* Charles Drader, *Gen. Mgr.* A. P. McEachern, *L. A. Sec.* M. F. Dolan, R. M. Kennett, *Sales Mgrs.* C. Z. Webb, *Gen. Supt. Ref.* C. W. Spark, *Asst. Supt.* George E. Stout, *Ch. Chem.* H. C. F. Drader, *Pur. Agt.* R. M. Kennett, *Traf. Mgr.* Refinery located at Pico, Calif.

Keystone Oil Refining Co., 12800 Northampton, Detroit, Mich.
William Fisher, *Pres., Treas., Sales Mgr.* and *Pur. Agt.* Nathan R. Epstein, *V. P.* Leon Kay, *Sec., Gen. Supt. Ref. and Pur. Agt.* William H. Osborn, Albert J. Diesing, *Ref. Supts.* Harry Erickson, *Ch. Chem.* T. P. Bissell, *Traf. Mgr.* Refinery located at Detroit, Mich.

Knox Refining Co., Enid, Okla.
Charles E. Knox, *Owner.* Roy E. Raemer, *Sales Mgr.* Refinery located at Covington, Okla.

Krieger Oil Co. of California, Box 188, Clearwater, Calif.
W. G. Krieger, *Pres.* and *Gen. Mgr.* Sam Goldman, *Sales Mgr.* V. R. Marichal, *Gen. Mgr. Ref.* L. G. Haworth, *Plant Foreman.* K. Boyce, *Prod. Supt.* M. S. Folson, *Ch. Chem.* V. R. Marichal, *Pur. Agt.* Refinery located at Clearwater, Calif.

L

Lacy, Roger, Refinery, Box 591, Kilgore, Tex.
Refinery located at Kilgore, Tex. (Leased to Lynch Ref. Co.)

Lake County Refinery, Polson, Mont.
Hilaire LeDoux, *Pres.* B. B. Owen, *V. P.* T. R. Delaney, *Sec.-Treas.* Hilaire LeDoux, *Gen. Mgr.* Refinery located at Polson, Mont.

La Salle Petroleum Co., 612 Wright Bldg., Tulsa, Okla.
Phil D. Williams, *Trustee, Burkburnett, Tex.* W. J. Schnur, *Agt., Tulsa.* F. A. Jamieson, *Sales Mgr., Burkburnett, Tex.* Phil D. Williams, *Gen. Mgr. Ref., Burkburnett, Tex.* W. J. Howard, *Ch. Chem., Burkburnett, Tex.* Refinery located at Burkburnett, Tex.

Leonard Refineries, Inc., Alma, Mich.; St. Louis, Mich.
J. W. Leonard, Jr., *Pres.* Bernard M. Jones, *V. P.* and *Sec.* Reid Brazell, *V. P., Treas.,* and *Gen. Mgr.* M. D. Vanderley, *Sales Mgr.* L. R. Kamperman, *Mgr. Bulk Sales.* R. W. Pollard, *Gen. Supt. Ref.* and *Ref. Supt., Alma, Mich.* Jesse E. Shaw, *Ref. Supt., St. Louis.* William Creger, *Ch. Chem.* H. H. Bintemire, *Ch. Engr.* A. J. Buese, *Truck Traf. Mgr.* G. O. Lowe, *Tank-car Traf. Mgr.* Refineries located at Alma, and St. Louis, Mich.

Lion Oil Refining Co., Exchange Bldg., El Dorado, Ark.
Col. T. H. Barton, *Pres.* T. M. Martin, *V. P.* and *Gen. Mgr.* A. F. Reed, J. J. Allinson, J. E. Howell, *V. Ps.* Jeff Davis, *Sec.* R. E. Meinert, *Treas.* A. F. Reed, *Sales Mgr., Whsle.* F. M. Rider, *Sales Mgr., Retl.* J. J. Allinson, *Gen. Mgr. Ref.* J. W. Poole, *Asst. Mgr. Ref.* F. B. Stamper, *Proc. Supt., El Dorado, Ark.* F. R. Grant, *Mgr. R. and D.* W. M. Carney, *Ch. Chem.* R. L. Van Zandt, *Ch. Engr.* R. E. Meinert, *Pur. Agt.* P. G. Anderson, *Traf. Mgr.* Refinery located at El Dodaro, Ark.

Los Nietos Producing & Refining Co., Ltd., 714 W. Olympic Blvd., Los Angeles, Calif.
C. E. Doheny, *Pres.* Olin Wellborn III, R. S. Lytle, C. W. Smith, *V. Ps.* G. W. Johnson, Jr., *Sec.* Olin Wellborn III, *Treas.* George Thompson, *Ref. Supt., Avenal, Calif.* Harry Wolf, *Ch. Chem.* W. H. Pierce, *Pur. Agt.* Refinery located at Kettleman Hills, Avenal, Calif.

Louisville Refining Co., American Life Bldg., Louisville, Ky.
Ell. H. Brown, Jr., *Pres.* J. Fred Miles, *V. P.* H. R. Smith, *Sec.-Treas.* R. D. Scott, *Sales Mgr.* J. J. Louderville, *Ref. Supt.* H. R. Smith, Jr., *Ch. Chem.* W. A. Waples, *Pur. Agt.* H. R. Smith, *Traf. Mgr.* Refinery located at Western Parkway, Louisville, Ky.

Lube Oil Corp., Alma, Mich.
R. B. Smith, *Chm. Bd.* G. F. Chase, *Pres.* H. F. Alexander, *V. P.* W. K. Graham, *Sec.* and *Treas.* Refinery located at Alma, Mich., under lease to Trumbull Asphalt & Refining Co., Chicago, Ill.

Lynch Ref. Co., Kilgore, Tex.
Nathan Lynch, *owner.* G. H. Burrow, *Lynch Refinery, Kilgore;* H. A. Mathews, *Plant No. 2, Kilgore,* G. B. Cashell, *Gladewater, Ref. Supts.* A. S. Robertson, *Ref. Mgr. Lynch Refinery, Kilgore.* Refineries located at Kilgore, Tex.* and Gladewater, Tex.†
*Lynch refinery leased from Roger Lacy. †Leased from Gladewater Ref. Co.

Mc

Macmillan Petroleum Corp., 530 W. Sixth St., Los Angeles, Calif.
R. S. Macmillan, *Pres.* S. M. Batterson, H. R. Macmillan, M. P. Macmillan, H. E. Boner, *V. Ps.* DeWitt Knox, *Sec.-Treas.* H. E. Boner, *Gen. Mgr. Ref.* W. H. Powell, *Ref. Supt., Long Beach.* C. C. Bent, *Ref. Supt., El Dorado.* George Ray, *Asst. Supt., El Dorado.* S. E. Campbell, *Ch. Chem.* Refineries located at Long Beach Calif.; El Dorado, Ark.; Borger, Tex.

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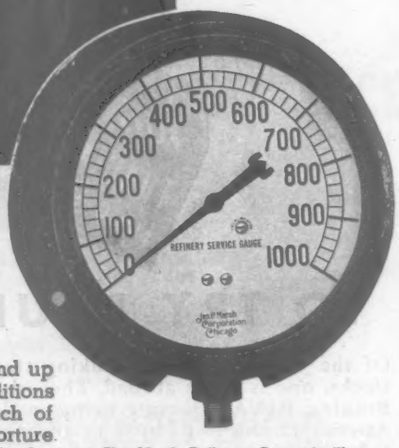

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M

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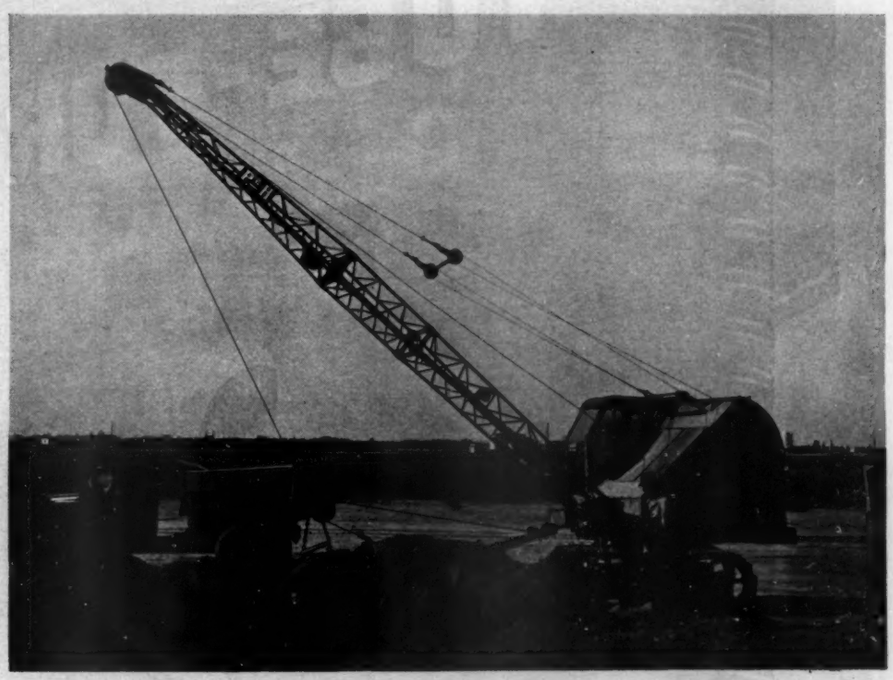

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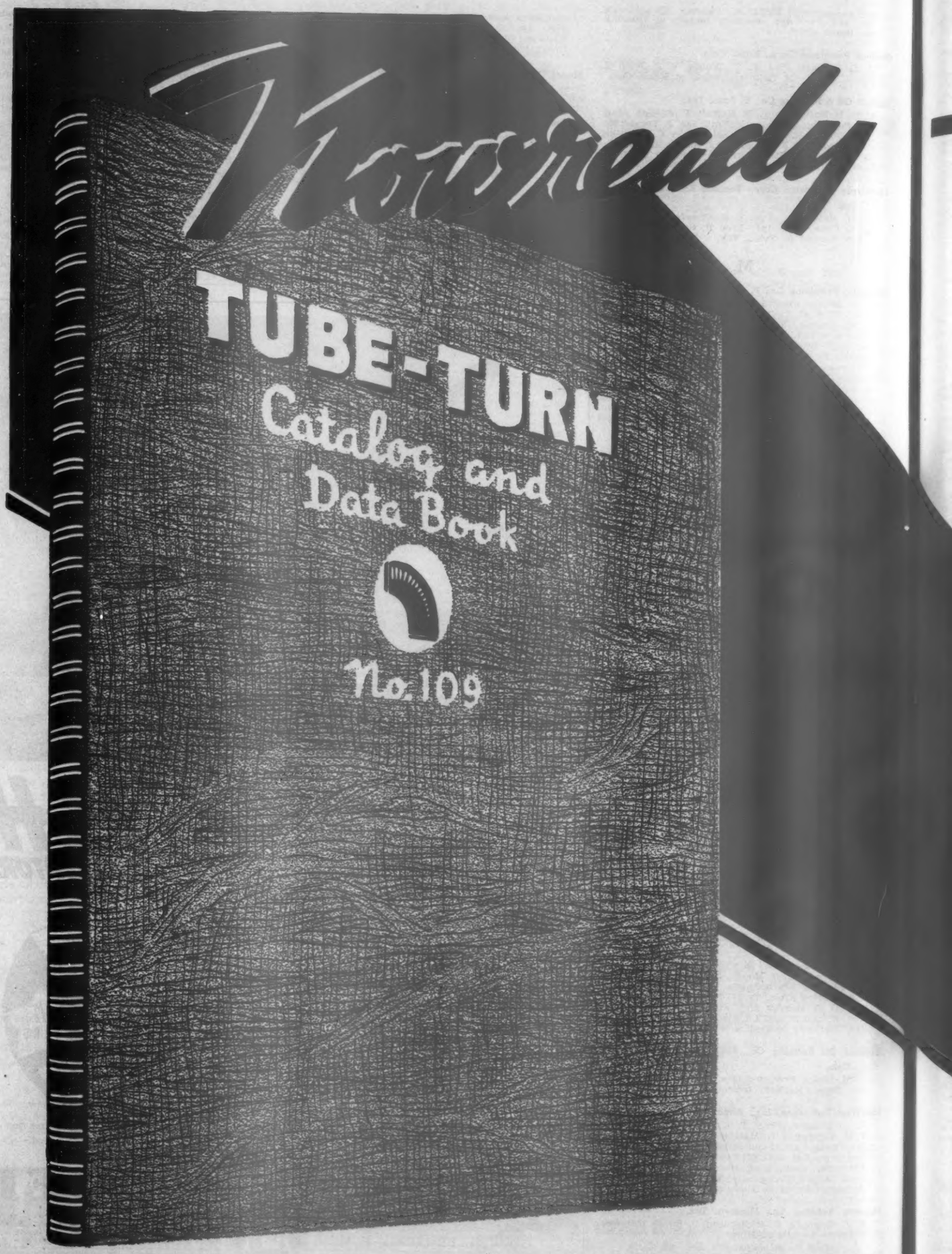
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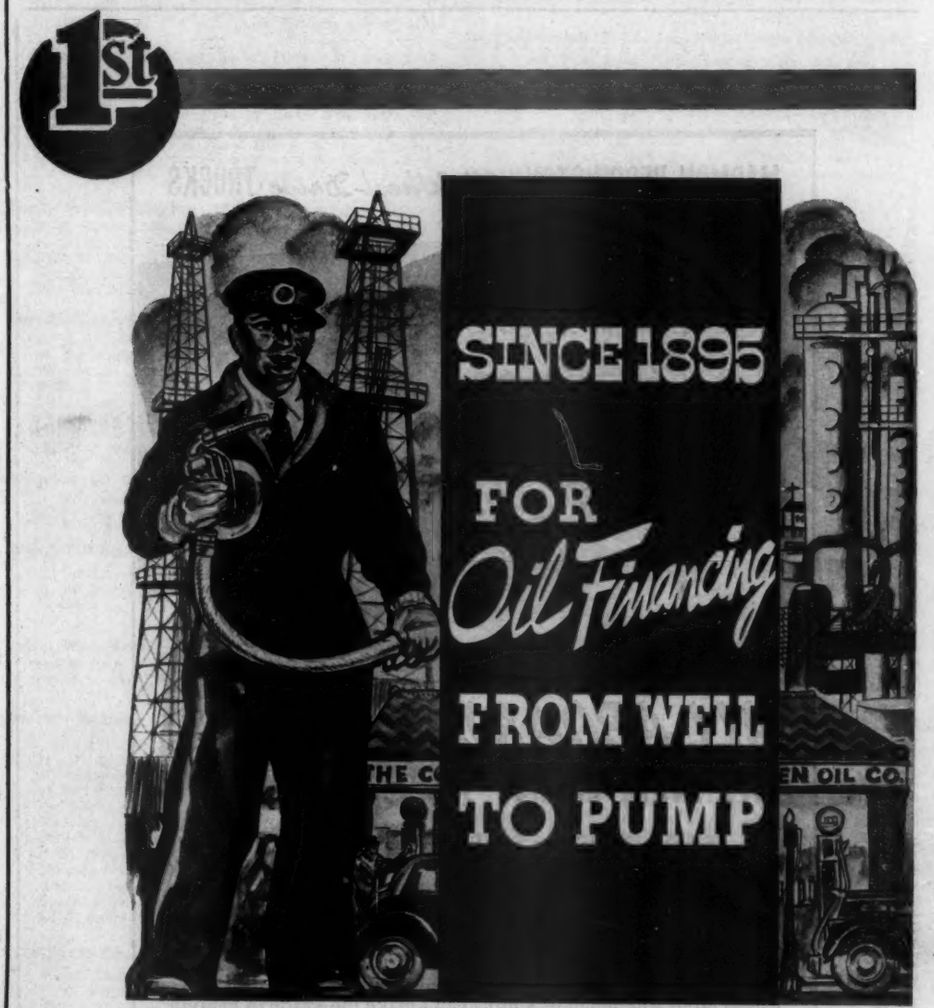

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Q

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Rusk Oil & Refining Co., Box 270, Tyler, Tex.

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S

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H. R. Gallagher, *Chm. Bd.* E. W. Sinclair, *Pres.* M. L. Gosney, *V. P.* and *Treas.* George H. Taber, Jr., *V. P. chg. Ref.* J. W. Carnes, Edward H. Chandler, Sheldon Clark, E. W. Isom, C. H. Kountz, J. R. Manion, J. M. O'Day, L. V. Stanford, K. Porter, *V. P.s.* O. M. Gerstung, *Sec.* E. B. Phillips, *Ch. Chem.* J. S. Hess, *Ch. Engr.* H. B. Malone, *Pur. Agt.* Refineries located at East Chicago, Ind.; Kansas City Kans.; Coffeyville, Kans.; Wellsville, N. Y.; Sand Springs, Okla.; Marcus Hook, Pa.; Fort Worth, Tex.; Gladewater, Tex.; Houston, Tex.; Parco, Wyo.

Skelly Oil Co., Skelly Bldg., Tulsa, Okla.

W. G. Skelly, *Pres.* W. T. Atkins, *V. P. chg. Mktg.* C. C. Herndon, Arch H. Hyden, H. M. Stalcup, *V. P.s.* J. F. Nagle, *Exec. Asst.* F. T. Hopp, *Sec.-Treas.* E. F. Underwood, *Sales Mgr., Whsle.* Jess Knowles, *Sales Mgr., Retl.* K. J. Smith, *Gen. Mgr. Ref.* A. G. Schuessler, *Asst. Supt.* and *Process Supt.* R. W. Leslie, *Mgr. R. and D.* E. A. Todd, *Ch. Chem.* L. E. Weber, *Ch. Engr.* F. W. Robertson, *Pur. Agt.* A. F. Winn, *Traf. Mgr.* Refinery located at Eldorado, Kans.

Snow Cap Oil Co., Sunburst, Mont.

Adam J. Eulberg, *Sole Owner.* Refinery located at Sunburst, Mont.

Socal Oil & Refining Co., Room 1004 Rowan Bldg., Los Angeles, Calif.

C. A. Johnson, *Pres.* and *Gen. Mgr. Ref.* J. H. Grimes, *V. P.* and *Ref. Supt.* Paul Fussell, *Sec.* P. J. Hallicy, *Treas.* W. E. Lanzer, *Sales Mgr.* E. T. Carlton, *Asst. Supt.* R. B. Whittington, *Ch. Chem.* Refinery located at Huntington Beach, Calif.

Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y.

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Socony-Vacuum Oil Co., Inc., Lubrite Division, 4140 Lindell Blvd., St. Louis, Mo.

H. T. Ashton, *Gen. Mgr.* W. H. Ware, *Sales Mgr.* D. A. Windsor, *Gen. Supt. Ref.* J. B. Hickey, *Ref. Supt.* A. J. Kirwin, *Asst. Supt.* L. T. Doiron, *Ch. Chem.* R. A. Frevert, *Ch. Engr.* J. H. MacCrea, *Pur. Agt.* O. E. Kuster, *Traf. Mgr.* Refinery located at East St. Louis, Ill.

Socony-Vacuum Oil Co., Inc., White Eagle Division, 1400 Fed. Res. Bank Bldg., Kansas City, Mo.

R. D. Mering, *Sales Mgr.* R. R. Irwin, *Gen. Mgr. Ref.* J. W. Glass, *Ref. Supt.,* Augusta. E. T. Pummil, *Ref. Supt.,* Casper. K. R. Kennedy, *Asst. Supt.,* Augusta. P. D. Cunningham, *Asst. Supt.,* Casper. H. L. Bedell, *Ch. Chem.* E. M. Skinner, *Ch. Engr.* W. C. Etzbach, *Pur. Agt.* H. L. McReynolds, *Traf. Mgr.* Refineries located at Augusta, Kans.; Casper, Wyo.

Solvents Refining Co., Vinvale, Calif.

George W. Rawlins, *Pres.* Carl Johnson, *Gen. Mgr.* Refineri located at Vinvale, Calif.

South Kentucky Pipe Line Co., Somerset, Ky.

R. C. Snyder, *Pres.* H. B. Wood, *V. P.* Earl R. Tate, *Sec.-Treas.* and *Sales Mgr.* Dexter Parmley, *Gen. Mgr. Ref.* L. E. Dodson, *Asst. Supt.* Earl R. Tate, *Pur. Agt.* Refinery located at Somerset, Ky.

Southland Refining Co., Olney, Tex.

Refinery located near Bryson, Tex.

Southport Petroleum Co. of Delaware, 1417 Commerce Bldg., Houston, Tex.

Cornelius Kroll, *Pres.* C. W. Murchison, Toddie Lee Wynne, *V. P.s.* Verne H. Maxwell, *Sec.* D. R. Zachry, *Treas.* C. F. Watson, *Sales Mgr.* Refinery located at Texas City, Tex.

Southwestern Oil & Refining Co., P. O. Box 1147, Corpus Christi, Tex.

S. S. Seltzer, *Pres.* F. R. Sylvestre, *V. P.* S. S. Seltzer, Jr., *Sec.-Treas.* W. B. Pickerell, *V. Sec.-Treas.* S. S. Seltzer, Jr., *Sales Mgr.* G. W. Stephenson, *Gen. Supt. Ref.* and *Pur. Agt.* W. N. Hicks, *Ch. Chem.* Refinery located at Corpus Christi, Tex.

Sovereign Refining Co., 777 N. Washington Ave., Saginaw, Mich.

Will J. Sovereign, *Pres.* and *V. P.* John S. Clark *Sec.* Florence L. Sovereign, *Treas.* C. A. Jouett, *Gen. Supt. Ref.* J. Lempke, *Pur. Agt.* Refinery located at Saginaw, Mich.

Standard Oil Co. of California, 225 Bush St., San Francisco, Calif.

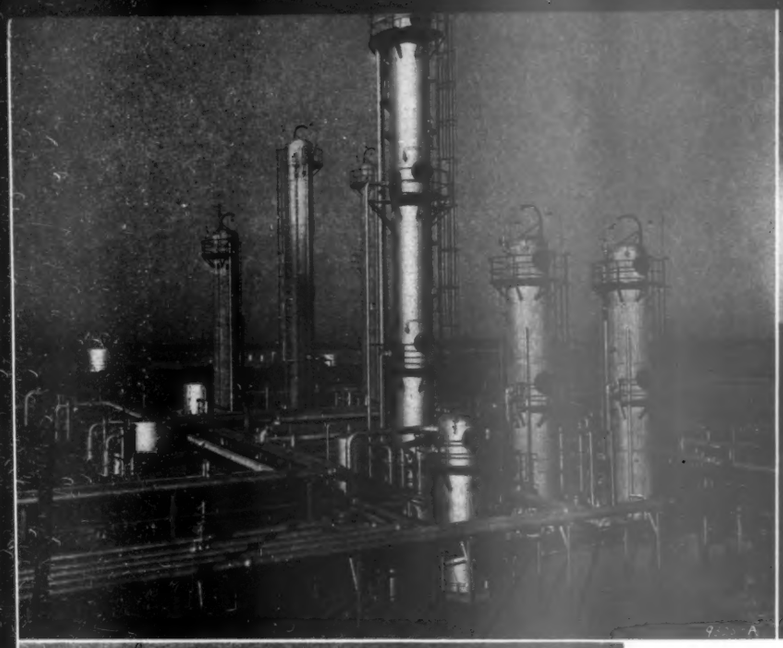
W. H. Berg, *Pres.* H. D. Collier, R. K. Davies, M. E. Lombardi, A. S. Russell, *V. P.s.* J. H. Tuttle. *Sec.* V. F. Palmer, *Treas.* H. B. Fairchild, *Gen. Sales Mgr.* R. G. Follis, *Gen. Mgr. Mfg. Dept.* F. H. Smith, Richmond; H. C. Hanna, El Segundo; C. A. Swigart, Bakersfield, *Ref. Mgrs.* D. J. Hanna, Richmond; R. K. Rowell, El Segundo, *Asst. Mgrs.* R. A. Halloran, *Mgr. R. and D.* J. B. Terry, *Ch. Chem.* H. H. Hall, *Ch. Engr.* F. G. Bryant, *Pur. Agt.* L. E. Fleming, *Mgr. Trans. Dept.* Refineries located at Richmond, El Segundo, and Bakersfield, Calif.

Standard Oil Co. (Indiana), 910 S. Michigan Ave., Chicago, Ill.

Edward G. Seubert, *Pres.* Charles J. Barkdull, *Exec. V. P.* Amox Ball, *V. P. chg. Sales.* A. W. Peake, *V. P. chg. Prod.* Max G. Paulus, *V. P. chg. Mfg.* Allan Jackson, *V. P.* Felix T. Graham, *Sec.* Ralph E. Clarke, *Treas.* R. F. McConnell, *Gen. Mgr. Sales.* Harry F. Glair, *Gen. Mgr. Mfg.* J. F. Hewson, *Gen. Mgr. Pur.* E. J. Shaeffer, Whiting; S. A. Montgomery, Wood River; R. E. Beard, Sugar Creek; H. R. Snow, Neodesha; C. C. Buchler, Casper and Greybull, *Ref. Supts.* Bruce K. Brown, *Mgr. R. and D.* Lee R. Cowles, *Traf. Mgr.* Refineries located at Whiting, Ind.; Wood River, Ill.; Sugar Creek, Mo.; Neodesha, Kans.; Casper, Wyo.; Greybull, Mont.

Standard Oil Co. of Louisiana, 2134 St. Charles Ave., New Orleans, La.

M. J. Rathbone, *Pres.* J. A. Bechtold, *V. P.* and *Treas.* M. W. Boyer, *V. P.* and *Gen. Mgr. Ref.* S. W. Day, J. R. McWilliams, J. E. Skehan, *V. P.s.* S. E.



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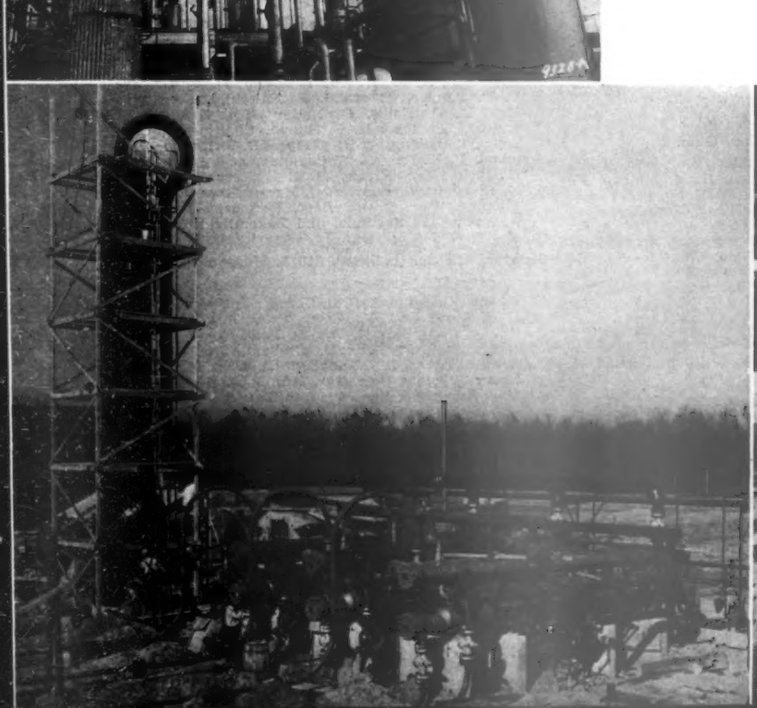

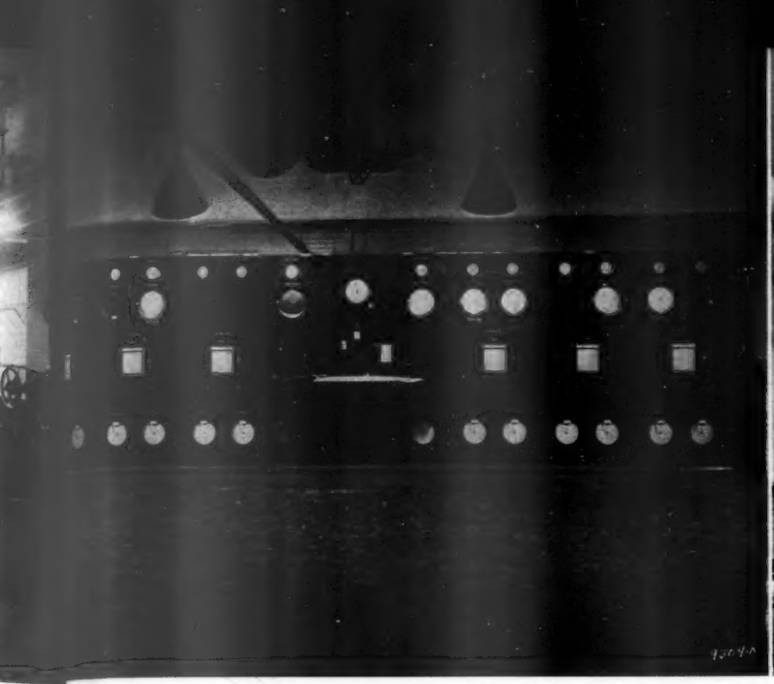

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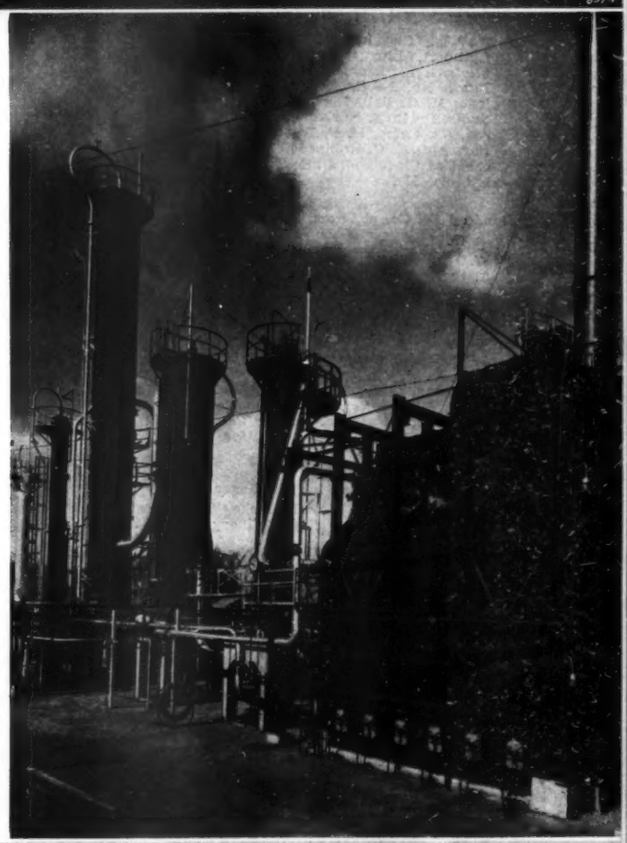

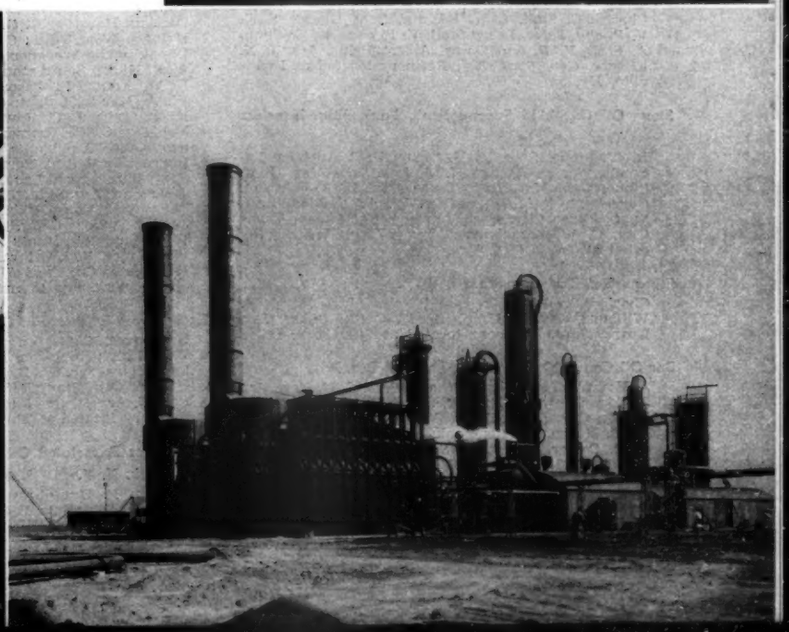

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Standard Oil Co. of Texas, 225 Bush St., San Francisco, Calif.

W. H. Berg, *Pres.* R. K. Davies, M. E. Lombardi, A. S. Russell, G. E. Kennedy, *V. P.s.* J. H. Tuttle, *Sec.* V. F. Palmer, *Treas.* Refinery located at El Paso, Tex.

Stanolind Oil & Gas Co., Philcade Bldg., Tulsa, Okla.

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Star Light Refining Co., Inc., Ballinger, Tex.

Art Tucker, *Pres.* Roy L. Duke, *Sec.-Treas.* O. P. Williams, *Gen. Mgr. Ref.* Refinery located at Ballinger, Tex.

State Refining Co., Grand Rapids, Mich.

E. L. Wellman, *Pres.* R. F. Glocklenski, *Sec.* E. G. Guy, *Gen. Supt. Ref.* Refinery located at Grand Rapids, Mich.

Steiner, Walter, Refining Co., P. O. Box 155, Hynes, Calif.

Walter H. Steiner, *Pres.* Adelaide Steiner, *Sec.-Treas.* Refinery located at Long Beach, Calif.

Stephens Refinery Co., Inc., Stephens, Ark.

W. B. Hassett, *Pres.* W. L. Hassett, *V. P.* L. E. Smart, *Sec.* R. H. Hassett, *Treas.* and *Gen. Mgr. Ref.* Refinery located at Stephens, Ark.

Stoll Oil Refining Co., Louisville, Ky.

Charles C. Stoll, *Chm. Bd.* and *Pres.* George Stoll, *V. P. chg. Sales.* Berry Stoll, *V. P. chg. Ref.* William A. Stoll, *V. P.* and *Treas.* Albert Prinz, *Sec.* J. N. Kittner, *Gen. Supt. Ref.* Refinery located at Louisville, Ky.

Stone Oil Co., 2115 Second Nat'l. Bank Bldg, Houston, Tex.

R. W. Stone, *Pres.* H. M. Stone, *V. P.* Adelaide LaCombe, *Sec.-Treas.* Roy H. Lindsey, *Sales Mgr.* H. M. Stone, *Gen. Mgr. Ref.*, Texas City. E. A. Johnson, *Gen. Supt. Ref.*, Texas City. W. A. Maddox, *Asst Supt.*, Texas City. Oran Johnson, *Ch. Chem.*, Texas City. C. W. Stoneburner, Texas City. Refinery located at Texas City, Tex.

Sturgis Refining Co., Sturgis, S. D.

Charles Brodsky, *Pres.* and *Sales Mgr.* Ralph E. Williams, *Treas.* H. J. Brodsky, *Ch. Chem.* Leo Kranz, *Supt.* Refinery located at Sturgis, S. D.

Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

J. Howard Pew, *Chm. Bd.* and *Pres.* J. N. Pew, Jr., J. Edgar Pew, A. E. Pew, Jr., S. B. Eckert, *V. P.s.* Frank Cross, *Sec.-Treas.* W. C. Pew, *Sales Mgr.* W. D. Mason, Marcus Hook; H. O. Cameron, Toledo; C. B. Carter, Yale, *Ref. Supts.* J. B. Hill, *Mgr. R. and D.* C. H. Thayer, *Ch. Engr.* H. Thomas, *Pur. Agt.* P. L. Howard, *Traf. Mgr.* Refineries located at Marcus Hook, Pa.; Toledo, Ohio; Yale, Okla.

Sunray Oil Co., Philtower Bldg., Tulsa, Okla.

C. H. Wright, *Pres.* F. L. Martin, *V. P. chg. Ref.* Elmo Thompson, Harry Mack, Paul Taliaferro, *V. P.s.* W. D. Forster, *Sec.* L. W. Bennett, *Treas.* J. B. Fairfields, *Sales Mgr.* R. L. Johnson, *Ref. Supt.*, Allen. A. D. Vinson, *Asst. Supt.*, Allen. Roy France, *Ch. Chem.*, Allen. R. E. Campbell, *Pur. Agt.* Refinery located at Allen, Okla.

Super Asphalt Products Co., The, 2990 Pine Ave., Long Beach, Calif.

W. H. Geis, *Pres.* Wm. Fred Scherer, *Sec.* Stephen F. Underwood, *Treas.* Wirt D. Rial, *Gen. Mgr:* C. A. Quinn, *Sales Mgr.* James Ormsby, *Ch. Engr.* William K. Neales, *Ch. Chem.* Refinery located at Long Beach, Calif.

Superior Oil Works, P. O. Box 56, Warren, Pa.

R. Z. Morrison, *Pres.* W. F. Clinger, *V. P.* and *Treas.* Charles H. Eaton, *Sec.* Owen E. McLeieer, *Gen. Mgr.* R. B. Allmendinger, *Ref. Supt.* and *Ch. Chem.* C. H. Eaton, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Warren, Pa.

Sweet Oil Refining Co., Wyman, Mich.

Ray Andres, *Chm. Bd.* Albert Kessler, *V. P.* Lloyd Wheeler, *Sec.-Treas.* and *Sales Mgr.* Ray Andres, *Gen. Mgr. Ref.* Floyd Bacon, *Gen. Supt. Ref.* and *Ch. Chem.* Emery Shepardson, *Asst. Supt.* Edwin Leggett, *Ch. Engr.* Lloyd Wheeler, *Pur. Agt.* and *Traf. Mgr.* Refinery located at Wyman, Mich.

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Talco Asphalt & Refining Co., P. O. Box 1011, Mount Pleasant, Tex.

J. K. MacKinnon, *Gen. Mgr.* Joe Dranguet, *Sec.-Treas.* H. O. Sivess, *Plant Supt.* R. D. McCrum, *Ch. Engr.* A. C. Johnson, *Ch. Chem.* R. B. Slay, *Pur. Agt.* Refinery located at Mount Pleasant, Tex.

Taylor Refining Co., Taylor, Texas.

G. L. Rowsey, *Pres.* J. F. Whitehurst, *V. P. chg. Sales, Retl.* Harris A. Melasky, *V.* and *Sec.-Treas.* Neil Buckley, *V. P. chg. Sales, Whsle.* C. C. Rockenback, *V. P.* Dorothy West, *Asst. Sec.* W. R. Arrington, *Asst. Treas.* J. L. Sewell, *Gen. Mgr. Ref.* H. M. Wilson, Taylor; B. H. Perkinson, Corpus Christi, *Ref. Supts.* Sam Jones, *Asst. Supt.*, Corpus Christi. S. A. Coleman, *Mgr. R. and D.* A. Porter, *Ch. Chem.* J. L. Sewell, *Pur. Agt.* Refineries located at Taylor, Tex.; Corpus Christi, Tex.

Telegraph Refining Corp., P. O. Box 343, Compton, Calif.

Refinery located at Compton, Calif.

Terminal Refining Corp., Box 1500, Corpus Christi, Tex.

T. E. McArdle, *Pres.* Dan D. Rogers, C. Andrade III, *V. P.s.* C. M. Hall, *Sec.-Treas.* T. E. McArdle, *Sales Mgr.* P. F. McArdle, *Gen. Mgr. Ref.* and *Pur. Agt.* J. E. McArdle, *Gen. Supt. Ref.* W. S. Cazort, Jr., *Ch. Chem.* Emil Geppelt, *Ch. Engr.* J. S. Presnall, Jr., *Traf. Mgr.* Refinery located at Corpus Christi, Tex.

Texas Co. (California), The, 929 South Broadway, Los Angeles, Calif.

C. E. Olmsted, *Pres.* T. H. Webb, *V. P.* and *Gen. Mgr.* R. T. Herndon, *V. P.* L. R. Holmes, *V. P. chg. Ref.* R. L. Saunders, New York, *Sec.* L. H. Lindeman, New York, *Treas.* W. J. Ryan, Los Angeles; J. R. Scanlin, Fillmore, *Ref. Supts.* W. F. Moore, *Mgr. Pur.* Refineries located at Los Angeles, Calif.; Fillmore, Calif.

Texas Co. (Delaware), The, 135 East 42nd St., New York, N. Y.

T. Rieber, *Chm. Bd.* W. S. S. Rodgers, *Pres.* C. E. Olmsted, *V. P. chg. Ref.* H. W. Dodge, H. T. Klein, J. S. Leach (Houston), R. Ogarrio, *V. P.s.* R. L. Saunders, *Sec.* L. H. Lindeman, *Treas.* F. P. Dodge, Port Arthur; F. S. Dengler, Port Neches; S. W. Darling, Houston; R. G. Collins, West Dallas; W. K. Holmes, West Tulsa; G. B. Bogart, Lockport; R. H. Donaldson, Shreveport; H. C. Wakefield, Pryse; A. E. Higgs, San Antonio; G. C. McSwain, Amarillo; H. A. Fouts, El Paso; L. F. J. Wilking, Casper; W. A. Martin, Calpet; G. O. Shefstead, Craig; C. J. King, Cody; J. C. Edwards, Sunburst; J. R. Reed Norfolk; C. G. Cramer, Claymont; V. B. Pevoto, Providence, *Ref. Supts.* W. F. Moore, *Mgr. Pur.* Refineries located at Port Arthur, Tex.; Port Neches, Tex.; Shreveport, La.; Houston, Tex.; West Dallas, Tex.; San Antonio, Tex.; El Paso, Tex.; Amarillo, Tex.; West Tulsa, Okla.; Pryse, Ky.; Lockport, Ill.; Casper, Wyo.; Craig, Colo.; Cody, Wyo.; Calpet, Wyo.; Sunburst, Mont.; Norfolk, Va.; Claymont, Del.; Providence, R. I. Calpet plant operates as California Petroleum Corp. of Utah, and Sunburst, Mont., plant operates as International Refining Co.

Three Rivers Refinery, P. O. Box 157, Three Rivers, Tex.

H. Coquat, *Chm. Bd.* and *Pres.* James O. Coquat, *V. P.* Ralph Robinson, *Mg. Dir.* and *Gen. Mgr. Ref.* Lee Peters, *Sec.* W. B. Pape, *Sales Mgr.* Roy K. Eggleston, *Gen. Supt. Ref.* Dr. Max Gisler, *Ch. Chem.* Earl F. Arnett, *Ch. Engr.* R. O. Ellerman, *Pur. Agt* Refinery located at Three Rivers, Tex.

Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y.

William F. Humphrey, *Pres.* C. R. Barton, L. F. Bayer, J. D. Collins, L. C. Dacius, B. I. Graves, K. R. Hankinson, George J. Hanks, L. D. Jurs, R. B. Pringle, R. E. Ryerson, E. H. Salrin, *V. P.s.* William J. Burker, *Sec.* K. R. Hankinson, *Treas.* H. S. Chase, Bayonne; L. M. Jagou, Drumright; T. O. Edwards, Avon; D. D. Stark, Watson, *Ref. Supts.*

Eastern Division:

D. E. Hoffman, *Sales Mgr., Whsle.* F. D. MacEachern, *Sales Mgr., Retl.* C. R. Barton, *Gen. Mgr. Ref.* F. W. Keebler, *Process Supt.* J. T. McCoy, *Mgr. R. and D.* R. S. Stanfield, *Ch. Engr.* A. Jungdahl, *Pur. Agt.* C. F. Dowd, *Traf. Mgr.*

Mid-Continent Division:

J. W. Warner, *Sales Mgr., Retl.* G. R. Kinter, *Gen. Mgr. Ref.* M. F. Bridges, *Pur. Agt.* J. D. Lewallen, *Traf. Mgr.*

Western Division:

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Refineries located at Bayonne, N. J.; Drumright Okla.; Avon, Calif.; Watson, Calif.

Tiernan Refining Co., 1650 East Spring St., Long Beach, Calif.

P. S. Tiernan, *Pres.* Joe W. Tiernan, *Gen. Mgr.* Refinery located at Long Beach, Calif.

Travis, M. M., Inc., P. O. Box 1502, Kilgore, Tex.

M. M. Travis, *Pres.* Arnold M. Travis, *V. P.* E. M. Travis, *V. P.* and *Sec.-Treas.* W. R. Hitchcock, *Sales Mgr.* J. H. Bullard, *Gen. Mgr. Ref.* H. A. Matthew, *Gen. Supt. Ref.* and *Pur. Agt.* M. P. Matthew, *Asst. Supt.* Ralph Matthew, *Ch. Chem.* J. H. Bullard, *Traf. Mgr.* Refinery located at Kilgore, Tex.

Treasure State Refining Co., Box 604, Shelby, Mont.

Frank P. Welsh, *Owner* and *Pur. Agt.* R. M. Kelley, *Gen. Mgr. Ref.* Refinery located at Shelby, Mont.

Triangle Oil & Refining Co., P. O. Box 206, Venice, Calif.

C. W. Allison, *Pres.* and *Treas.* L. W. Frankley, *V. P.* H. S. Capron, *Sec.* and *Pur. Agt.* L. R. Taylor, *Gen. Supt. Ref.* Refinery located at Venice, Calif.

Tri-State, Inc., Thermopolis, Wyo.

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Tri-State Refineries, Inc., P. O. Box 316, Henderson, Ky.

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U

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V

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Y

Yale Oil Corp., P. O. Box 2094, Billings, Mont.

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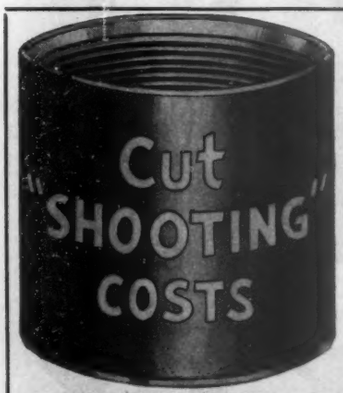

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B

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C

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D

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E

Eston Refining Co., Ltd., Eston, Saskatchewan, Canada.

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F

Fraser, J. W., Refining Co., Wainwright, Alberta, Canada.

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G

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H

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Home Oil & Refining Co., Ltd., Humboldt, Saskatchewan, Canada.

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I

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L

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Mc

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M

Mid-West Refineries, Ltd., Box 475, Dauphin, Manitoba, Canada.

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N

Natural Sodium Products, Ltd., Bishopric, Saskatechewan, Canada.

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O

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R

Redio Oil Refineries, Ltd., East Kildonan, Manitoba, Canada.

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S

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P. McKenna, *Pres.* T. G. Gibson, *V. P.* W. J. Milne, *Sec.-Treas.* P. McKenna, *Gen. Supt. Ref.* Refinery located at Yorkton, Saskatchewan, Canada.

Personnel of Refineries in Mexico

Petroleos Mexicanos, Mexico, D. F.

Petroleos Mexicanos, owned and operated by the Mexican Government, is in charge of operating the refineries which were expropriated by the government. Three of the plants formerly were operated by Compania Mexicana de Petroleo "El Aguila" (Shell) and one each by the Huasteca Petroleum Co. (Standard of New Jersey) and Pierce Oil Co. (Consolidated). The refinery management includes the following:

Vicente Cortes Herrera, *Gen. Mgr.* Carlos L. Corcuera, *Gen. Mgr. of Refineries.* Salvador Benavides, *Supt. Ciudad Madero.* Juan Avina, *Supt. Arbol Grande;* B. F. Grajales, *Supt. Bella Vista.* R. de la Fuente, *Supt. Mata Redonda.* Eduardo Perez, *Supt. Poza Rica.* Luis R. Torres, *Supt Minatitlan.* F. Aznar, *Supt. Mexico City.*

93% Average SALT EXTRACTION EFFICIENCY

An accurate check recently disclosed that the total salt content of the crudes charged to twenty-five Petreco Electromatic De-Salting Plants during one month's operation amounted to 647,000 pounds. Of this volume of soluble material approximately 93%, or 600,000 pounds, was removed by the Petreco process; in addition to an appreciable amount of sand, drilling mud and other insolubles such as calcium sulfate.

This average overall efficiency is surprisingly high in view of the number of plants involved, the wide range of crudes being handled, and also the fact that the plants are located in widely separated districts extending from New Mexico to Louisiana and from Michigan to Texas.

From the standpoint of efficient salt extraction and cost per barrel of crude run, as well as the elimination of serious refining difficulties and operating expenses, the Petreco process repeatedly has proved to be the most satisfactory solution to the salt problem. Refiners having salt problems are invited to write for detailed information.

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA

General Offices: 530 West Sixth Street, Los Angeles, California
Gulf Coast Headquarters: Houston, Texas
Representatives In Principal Oil Fields and Refining Centers

Eliminate The Trouble By Removing The Cause

OWNERS OF THE

PETREC O

Electromatic

Refineries Operating in United States

Explanation of Terms Used in Operating Survey

(Comp.)—Complete plant, gasoline, kerosene, gas oil, fuel oil, lubricating oils, paraffin, wax, and asphalt, usually includes cracking.

(S)—Gasoline, kerosene distillate, gas oil, and fuel oil.

(L)—Lubricating oils.

(A)—Asphalt.

(C)—Same products as skimming, except equipped for cracking.

(W)—Wax.

ALABAMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Coastal Petroleum Corp., Mobile	4,000	.....	S	
Total	4,000	.....		

ARKANSAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Berry Asphalt Co., Waterloo	2,000	.....	S-L-A	
Cross Co., Henry H., Smackover	6,000	1,500	S-C-L-A	Donnelly
Lion Oil Ref. Co., El Dorado	17,000	4,000	S-C-L-A	Own
Macmillan Pet. Corp., Norphlet	2,500	.....	S-L-A	
Root Pet. Co., El Dorado	10,000	6,000	S-C	Winkler-Koch
Stephens Ref. Co., Inc., Stephens	750	.....	S	
Total	38,250	11,500		

CALIFORNIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aromalene, Inc., Long Beach	1,800	.....	S	
Atlas Ref. Co., North Long Beach	2,500	.....	S	
Bush, R. R., Oil Co., Long Beach	4,000	.....	S	
California Oil & Ref. Co., N. Long Beach	2,500	.....	S	
Caminol Co., Ltd., Santa Fe Srings	3,000	.....	S	
Caminol Co., Ltd., Hanford	3,000	.....	S	
Capitol Crude Oil Co. of L. A., Santa Paula	160	.....	S	
Century Oil Co., Signal Hill	5,000	.....	S	
Comet Oil Co., Ltd., Long Beach	*2,000	.....	S	
Eagle Oil & Ref. Co., Santa Fe Springs	1,500	1,000	S-C	Own
East-West Ref. Co., Los Angeles	3,000	.....	S	
El Camino Ref. Co., Los Alamitos	3,000	.....	S	
Elm Oil Co., Long Beach	2,200	.....	S	
El Tejon Oil & Ref. Corp., Bakersfield	3,500	2,000	S-C	Dubbs
Envoy Pet. Co., Long Beach	3,500	.....	S	
Estado Pet. Corp., Long Beach	12,000	.....	S	
Exeter Ref. Co., Long Beoch	10,000	.....	S-A	
Five C Ref. Co., Santa Maria	2,500	.....	S-A	
Flétcher Oil Co., Inc., Wilmington	2,000	2,700	S-C	Dubbs
Garvanza Oil Co., Inc., Santa Maria	2,000	.....	S	
General Pet. Corp. of Calif., Torrance	52,000	19,000	S-C	Lummus-Kellogg
General Pet. Corp. of Calif., Lebec	12,000	.....	S	
Gilmore Oil Co., Los Angeles	2,500	.....	S-A	
Golden Bear Oil Co., Oildale	2,000	.....	S-L-A	Vacuum
Hancock Oil Co. of Calif., Long Beach	12,500	5,000	S-C	W. T. Hancock
Harbor Ref. Co., Inc., Long Beach	2,500	.....	S	
Industrial Oil & Ref. Co., Southgate	500	.....	S-L	
Kern Oil Co., Ltd., Pico	3,500	.....	S	
Krieger Oil Co. of Calif., Clearwater	3,000	.....	S-A	
Lake View Oil & Ref. Co., Maricopa	2,000	.....	S	
Los Nietos Prod. & Ref. Co., Ltd., Kettleman Hills	1,500	.....	S	
Macmillan Pet. Corp., Long Beach	8,000	.....	S	
McCallen Ref. Co., Huntington Beach	3,500	.....	S	
Mercury Pet. Corp., Venice	2,500	.....	S-A	
Mohawk Pet. Co., Bakersfield	12,000	1,500	S-C-A	Own
New Santa Maria Ref. Co., Santa Maria	1,500	.....	S	
Norwalk Co., Maricopa	5,000	.....	S	
Olympic Ref. Co., Long Beach	6,000	.....	S	
Operators Oil & Ref. Co., Long Beach	2,000	.....	S	
Pacific States Oil Co., Wilmington	7,000	3,500	S-C	Own
Palomar Ref. Co., Mountain View	1,500	.....	S	
Pan Pacific Oil Co., Wilmington	1,000	.....	S	
Pathfinder Pet. Co., Los Alamitos†	.....	1,100	C	Own
Petrolane, Ltd., Long Beach	2,000	.....	S	
Petco Oil Corp., Santa Maria	9,500	.....	S-A	
Petrol Corp., Los Angeles	2,500	.....	S	
Richfield Oil Corp., Watson	80,000	52,000	Comp.	Sinclair, Black
Rothschild Oil Co., Santa Fe Springs	3,000	.....	S	
San Fernando Ref. Co., Newhall	2,500	.....	S-A	
Seaside Oil Co., Ventura	5,000	.....	S-A	
Shell Oil Co., Inc., Martinez	25,500	25,000	S-C-L-A	Dubbs-Own
Shell Oil Co., Inc., Oil Fields	6,600	.....	S	
Shell Oil Co., Inc., Wilmington	38,000	33,200	S-C-A	Dubbs
Signal Hill Ref. Co., Long Beach	5,000	.....	S	
Silver Wing Ref. Co., Santa Maria	2,000	.....	S	
Socal Oil & Ref. Co., Huntington Beach	3,000	.....	S	
Solvents Ref. Co., Vinvale	500	.....	S	
Standard Oil Co. of Calif., El Segundo	100,000	85,000	S-C-L-A	Dubbs
Standard Oil Co. of Calif., Richmond	100,000	56,000	S-C-L-A	Dubbs
Standard Oil Co. of Calif., Seguro	25,000	.....	S-A	
Super Asphalt Prod. Co., Long Beach	1,500	.....	S-A	
Texas Co. of Calif., Los Angeles	37,000	10,000	S-C	Holmes-Manley
Texas Co. of Calif., Fillmore	4,000	3,000	S-C	Cross
Tide Water Associated Oil Co., Associated	42,000	22,600	S-C-L-W	Tube & Tank
Tide Water Associated Oil Co., Watson	14,000	7,800	S-C-A	Tube & Tank
Tiernan Ref. Co., Long Beach	1,000	.....	S	
Triangle Oil & Ref Co., Venice	3,000	.....	S	
Union Oil Co., Wilmington	‡57,000	¶3,600	S-C-A	Cross
Union Oil Co., Maitha	5,000	.....	S	
Union Oil Co., Oleum	§34,000	¶3,800	S-C-L-A	Union-Gasoline Prod.
Wilshire Oil Co., Inc., Norwalk	15,000	12,000	S-C	Dubbs
Total	836,760	349,800		

*Operating on kerosene distillate and gas oil.
†Cracking plant only.
‡Includes two topping and viscosity reduction units.
§Includes 14,000 bbl. daily of effective throughput capacity of cracking plant.
¶Represents cracked gasoline output capacity of cracking units.

COLORADO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bay Pet. Corp., Denver	4,000	1,700	S-C	
Continental Oil Co., Denver	2,700	1,500	S-C	Cross
Gramps Oil & Ref. Corp., Alamosa	1,250	700	S-C	Dubbs
Oriental Ref. Co., Denver	3,000	.....	S	
Perry Pet. Co., Denver	1,600	.....	S	
Raven Oil & Ref. Co., Rangely	125	.....	S	
Texas Co., Craig	2,000	2,000	S-C	Holmes-Manley
Universal Refineries, Inc., Pueblo	1,000	.....	S	
Total	15,675	5,900		

DELAWARE

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Texas Co., Claymont	3,500	.....	S-A	
Total	3,500	.....		

GEORGIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Mexican Pet. Corp. of Georgia, Savannah	4,000	.....	S-A	
Total	4,000			

IDAHO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Idaho Ref. Co., Pocatello	2,000	1,250	S-C	T.V.P.
Total	2,000	1,250		

ILLINOIS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Advance Ref. Co., Inc., Centralia	2,000	.....	S	
Allied Oil Corp. of Ill., St. Elmo	4,000	.....	S	
Basin Oil Ref. Co., Centralia	2,000	.....	S	
Calumet Ref. Co., Chicago	1,200	.....	S-L	Schulze high vacuum
Centralia Ref. Co., Centralia	2,000	.....	S	
Cross, Henry H. Co., Colmar	1,000	.....	S	
Cross, Henry H. Co., Dupo	1,000	.....	S	
Egyptian Prod. & Ref. Co., Centralia	2,500	.....	S	
Fairfield Ref. Corp., Fairfield	1,800	.....	S	
Globe Oil & Ref. Co. (Ill.), Lemont	20,000	4,000	S-C	Winkler-Koch
Goodson Oil Co., Inc., Sandoval	1,000	.....	S	
Indian Ref. Co., Lawrenceville	23,000	11,600	Comp.	De Florez-Texas
Ohio Oil Co., Robinson	12,500	6,500	S-C-A	Holmes-Manley & Kellogg
Pana Ref. Co., Pana	4,000	1,600	S-C	Dubbs
Red River Ref. Co., Burnham	1,000	.....	S-L	
Shell Oil Co., Inc., Wood River*	47,000	31,500	S-C-L-A	Dubbs, Cross & T.V.P.
Socony-Vacuum Oil Co., Inc., E. St. Louis	7,000	2,200	S-C	
Standard Oil Co. (Ind.), Wood River	21,700	6,410	S-C-L-A	Holmes-Manley
Texas Co., Lockport	36,000	25,000	Comp.	Holmes-Manley De Florez Pressure Coke
Worth Ref. Co., Blue Island	7,000	.....	S	
Total	197,700	88,810		

*To be increased to 75,000 bbl. to replace East Chicago plant.

INDIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cities Service Oil Co. (Del.), East Chicago	30,000	18,000	S-C	Doherty
Indiana Farm Bureau Coop. Assn., Inc., Mount Vernon*	2,000	.....	S	
Johnson Oil Supply Co., Gary	2,000	.....	S	
Shell Oil Co., Inc., East Chicago†	30,000	21,000	S-C	Dubbs
Sinclair Ref. Co., East Chicago	45,000	30,000	S-C-L-W	Sinclair 600
Socony-Vacuum Oil Co., Inc., E. Chicago	12,000	3,900	S-C	
Standard Oil Co. (Ind.), Whiting	119,000	47,700	Comp.	Holmes-Manley, Cross Combination
Troy Ref. Corp., Troy	250	.....	S	
Total	240,250	120,600		

*Constructing.
†Will be converted to terminal in near future.

KANSAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bareco Oil Co., Wichita	5,000	2,500	S-C	Dubbs
Bay Pet. Corp., McPherson	4,000	2,500	S-C	
Chanute Ref. Co., Chanute	.....	1,000	C	
Cooperative Ref. Assoc., Phillipsburg	3,500	1,800	S-C	Dubbs
Derby Oil Co., Wichita	8,000	3,000	S-C-A	Dubbs
El Dorado Ref. Co., Eldorado	7,000	8,000	S-C	Winkler-Koch
Falcon Ref. Co., Great Bend	2,500	.....	S	
Fredonia Oil & Ref. Co., Fredonia	250	.....	S	
Globe Oil & Ref. Co., McPherson	15,000	3,000	S-C-L	Winkler-Koch
Kanotex Ref. Co., Arkansas City	12,000	4,000	S-C-A	Donnelly
National Ref. Co., Coffeyville	8,000	4,000	Comp.	Own
Phillips Pet. Co., Kansas City	23,000	9,000	S-C	Own-Dubbs
Roper Pet. Co., Parsons	550	.....	S	
Shallow Water Ref. Co., Shallow Water	2,000	500	S-C-A	Hall
Sinclair Ref. Co., Coffeyville	12,000	7,000	S-C-L-W	Sinclair 600
Sinclair Ref. Co., Kansas City	11,000	7,000	S-C	Sinclair 600
Skelly Oil Co., Eldorado	23,000	15,000	S-C-L-A	Winkler-Koch
Socony-Vacuum Oil Co., Augusta	21,500	10,000	S-C-A	
Standard Oil Co. (Ind.), Neodesha	7,400	2,640	S-C	Combination
Vickers Pet. Co., Potwin	4,000	2,000	S-C	Dubbs
Total	169,700	82,940		

KENTUCKY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aetna Oil Service, Inc., Louisville	8,500	3,000	S-C	Gasoline Prod. Licensee
Ashland Oil & Ref. Co., Catlettsburg	9,000	4,000	S-C-A	Dubbs
Louisville Ref. Co., Louisville	7,000	3,500	S-C-A	Dubbs
South Ky. Pipe Line Co., Somerset	400	.....	S	
Standard Oil Co. (Ohio), Latonia	11,000	7,500	S-C-A	Tube & Tank
Stoll Oil Ref. Co., Louisville	2,000	.....	S-W	
Texas Co., Pryse	3,000	2,500	S-C	Holmes-Manley
Tri-State Refineries, Inc., Spottsville	1,000	.....	S	
Total	41,900	20,500		

LOUISIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Arkansas Fuel Oil Co., Bossier City	23,000	17,000	S-C	Tube & Tank La. Coil Combination
Atlas Pipe Line Corp., Jewella	12,000	6,000	S-C	Gyro
Bayou State Oil Corp., Hosston	800	.....	S-L-A	
Chalmette Pet. Corp., Chalmette	8,500	6,000	S-C	Cross
East Texas Ref. Co., Rodessa	7,000	.....	S	
Evansville Oil Corp., Cotton Valley	1,000	.....	S	
Pan American Pet. Corp., Destrehan	10,000	.....	S-A	
Pennant Ref. Corp., Princeton	800	.....	S-L-A	
Premier Oil Ref. Co. of Tex., Cotton Valley	3,500	.....	S	
Rodessa Oil & Ref. Corp., Cedar Grove	10,000	6,000	S-C	Forward Process
Shell Oil Co., Inc., Norco	21,000	14,000	S-C-A	Dubbs
Standard Oil Co. of La., Baton Rouge	100,000	52,000	Comp.	Tube & Tank
Stanolind Oil & Gas Co., Superior	5,000	1,800	S-C	Cross
Texas Co., Shreveport	7,000	.....	S	
Total	209,600	102,800		

MARYLAND

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Continental Oil Co., Baltimore	7,500	3,500	S-C-A	Cross
Pan American Ref. Corp., Baltimore	8,000	.....	S-A	
Standard Oil Co. of N. J., Baltimore	32,000	48,000	S-C-L-A	Tube & Tank
Total	47,500	51,050		

MASSACHUSETTS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cities Service Oil Co. (Pa.), E. Braintree	25,000	18,000	Comp.	Combination-Own
Colonial Beacon Oil Co., Everett	30,600	35,700	S-C-A	Tube & Tank
Total	55,600	53,700		

MICHIGAN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aurora Gasoline Co., Elsie	2,500	.....	S	
Aurora Gasoline Co., Detroit	2,500	.....	S	
Bair Oil Co., F. M., Grand Ledge	300	.....	S	
Bay Ref. Corp., Bay City	4,400	.....	S	
Crystal Ref. Co. of Carson City, Inc., Carson City	3,000	.....	S	
Fort-Dale Oil & Ref. Co., Bloomingdale	1,500	.....	S	
Glenco Ref. Co., Bloomingdale	2,000	.....	S	
Imperial Ref. Co., Dewey	2,000	.....	S	
Imperial Ref. Co., Grandville	4,000	.....	S	
Independent Ref. Co. of Mich., Flat Rock	1,450	1,000	S-C	McKee Vapor Phase
Keystone Oil Ref. Co., Detroit	2,500	.....	S-L	
Leonard Refineries, Inc., Alma	3,000	1,200	S-C-A	Dubbs
Leonard Refineries, Inc., St. Louis	4,000	1,200	S-C-A	Dubbs Reforming
Mid-West Refineries, Inc., Alma	3,200	1,200	S-C	Dubbs Reforming
Naph-Sol Ref. Co., Muskegon	5,000	2,200	S-C	Dubbs
Old Dutch Ref. Co., Muskegon	5,000	1,500	S-C	True Vapor Phase
Peerless Oil Co., Saginaw	1,000	.....	S	
Producers Ref., Inc., West Branch	2,500	.....	S-A	
Pure Oil Co., Midland	3,200	.....	S	
Roosevelt Oil Co., Mount Pleasant	5,000	1,000	S-C-L	Own
Socony-Vacuum Oil Co., Trenton	24,500	9,600	S-C	
State Ref. Co., Grand Rapids	1,500	.....	S	
Sweet Oil Ref. Co., Wyman	2,000	.....	S	
Trumbull Asphalt & Ref. Co., Alma	*1,500	.....	S-A-W	Vacuum
Trumbull Asphalt & Ref. Co., West Branch	*1,250	.....	S-A	Vacuum
Total	88,800	18,900		

*Reduced crude.

MINNESOTA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Northwestern Ref. Co., St. Paul Park	1,500	.....	S	
Total	1,500	.....		

MISSOURI

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Joplin Ref. Co., Joplin	500	.....	S	
Standard Oil Co. (Ind.), Sugar Creek	21,800	6,260	S-C-A	Holmes-Manley
Total	22,300	6,260		

MONTANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bears Den Refinery, Chester	50	.....	S	
Big West Oil Co. of Mont., Kevin	1,200	800	S-C	Dubbs
Bridger Refinery, Bridger	20	.....	S	
Carroll, L. Ray, Roundup	100	.....	S	
Continental Oil Co., Lewistown	1,225	.....	S	
Cut Bank Ref. Co., Cut Bank	1,300	400	S-C	Experimental
Gallatin Valley Co-Operative Co., Belgrade	350	.....	S	
Gallup City Refinery, Gallup City	150	.....	S	
Glacier Prod. Co., Cut Bank	4,500	2,200	S-C	Dubbs
Hannah-Porter Co., Border field	300	.....	S	
Hart Refineries, Missoula	300	300	S-C	
Havre Ref. Co., Havre	500	.....	S	
Hawley Ref., Conrad, Mont.	150	.....	S	
Hole Bros. Refinery, Cut Bank	400	.....	S	

MONTANA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Home Oil & Ref. Co., Great Falls	1,600	1,000	S-C-A	Dubbs
Home Oil & Ref. Co., Conrad	600	.....	S	
Hunt, Eugene, Winnett	400	.....	S	
Independent Ref. Co., Laurel	3,500	2,000	S-C-A	Dubbs Two-Coil
Morton Refinery, Oilmont	125	.....	S	
North American Ref. Co., Chinook	500	.....	S	
Northwest Ref. Co., Cut Bank	3,000	1,000	S-C	Dubbs
Pondera Valley Refinery, Pondera field	75	.....	S	
Red Lodge Refinery, Red Lodge	15	.....	S	
Sandgren & Nyhagen, Cut Bank	35	.....	S	
Snow Cap Oil Co., Sunburst	400	.....	S	
Sun River Refinery, Great Falls	100	.....	S	
Texas Co. (Internat'l Ref. Co.), Sunburst	6,000	4,500	S-C	De Florez
Treasure State Ref. Co., Shelby	350	.....	S	
Unity Pet. Corp., Kalispell	800	600	Comp.	Vapor Phase
Walgren, C. E., Santa Rita	100	.....	S	
Yale Oil Corp., Billings	8,000	.....	S-C-L-A	
Yale Oil Corp., Kalispell	1,000	.....	S	
Total	37,145	12,800		

NEBRASKA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Carpenter, Terry, Inc., Scottsbluff	1,700	700	S-C	Gasoline Prod. Licensee
Chadron Refinery, Chadron	1,500	.....	S	
Gordon Ref. Co., Gordon	250	.....	S	
Petroleum Utilities Co., Inc., Chadron	600	.....	S	
Porter Oil Co., Sidney	300	.....	S	
Total	4,350	700		

NEW JERSEY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Barber Asphalt Corp., Perth Amboy	10,000	3,000	S-C-A	Cross
Cities Service Oil Co. (Pa.), Camden	22,000	22,000	S-C	Combination-Own
Cities Service Oil Co. (Pa.), Linden	15,000	.....	S-A	
Socony-Vacuum Oil Co., Paulsboro	25,200	2,900	S-C-L-W	
Standard Oil Co. of N. J., New Jersey Works (Bayonne, Linden, Jersey City)	*104,500	105,000	Comp.	Tube & Tank
Tide Water Associated Oil Co., Bayonne	55,000	21,000	S-C-L-W	Tube & Tank
Total	231,700	153,900		

*Not including 19,500 bbl. temporarily shut down.

NEW MEXICO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aerex Co., Bloomfield	100	.....	S	
Basin Ref. Co., Aztec	100	.....	S	
Continental Oil Co., Albuquerque	625	.....	S	
Continental Oil Co., Artesia	1,500	640	S-C	Cross
Continental Oil Co., Farmington	750	.....	S	
Malco Refineries, Inc., Artesia	2,000	1,000	S-C	Dubbs
McNutt Oil & Ref. Co., Brickland	1,500	750	S-C	Donnelly
Pecos Diamond Ref. Co., Inc., Artesia	325	.....	S	
Valley Ref. Co., Roswell	1,200	600	S-C-A	Dubbs
Total	8,100	2,990		

NEW YORK

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Allegany Refineries, Inc., Bolivar	1,200	.....	S	
Frontier Fuel Oil Corp., Buffalo	2,500	.....	S-A	
Gulf Oil Corp., Staten Island	13,000	.....	S	
Sinclair Ref. Co., Wellsville	10,000	6,000	S-C-L-W	Sinclair 600
Socony-Vacuum Oil Co., Brooklyn and Long Island City	19,000	5,200	Comp.	
Socony-Vacuum Oil Co., Buffalo	14,500	7,200	S-C-L-W	
Socony-Vacuum Oil Co., Olean	6,500	.....	S-L-W	
Total	66,700	18,400		

OHIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Canfield Oil Co., Cleveland	1,500	.....	S	
Canton Ref. Co., Canton	6,000	2,000	S-C	Dubbs
Gulf Ref. Co., Cleves	18,000	8,000	S-C-A	Gulf
Gulf Ref. Co., Toledo	18,000	7,000	S-C	Gulf
National Ref. Co., Findlay	3,200	1,300	Comp.	Own
National Ref. Co., Marietta	700	.....	S-L-W	
Pure Oil Co., Heath	16,000	12,500	S-C	Cross, Comb. High Pressure
Pure Oil Co., Toledo	17,500	17,500	S-C	High Pressure, Comb. High Pressure
Standard Oil Co. (Ohio), Cleveland	23,000	13,000	Comp.	Tube & Tank
Standard Oil Co. (Ohio), Lima	8,000	5,000	S-C	Solar
Standard Oil Co. (Ohio), Toledo	13,500	.....	S-L-W	Kellogg Combination
Sun Oil Co., Toledo	25,000	13,000	S-C	Own-Houdry
Total	150,400	79,300		

OKLAHOMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Anderson-Prichard Ref. Corp., Cyril	8,000	5,000	S-C-A	Winkler-Koch
Bareco Oil Co., Barnsdall	5,000	2,700	S-C-L-W	Cross
Bell Oil & Gas Co., Grandfield	3,500	2,000	S-C	Dubbs
Ben Franklin Ref. Co., Ardmore	4,000	2,000	S-C	Dubbs
Black Gold Ref. Co., Oklahoma City	2,500	1,300	S-C	Dubbs
Champlin Ref. Co., Enid	15,000	5,000	S-C-L	Own
Cities Service Oil Co. (Del.), Ponca City	12,000	4,500	Comp.	Dubbs-Doherty
Continental Oil Co., Ponca City	26,000	12,250	S-C-L-W	Dubbs-Cross
Cushing Ref. & Gaso. Co., Cushing	4,000	2,000	S-C	Dubbs
Deep Rock Oil Corp., Cushing	10,000	5,000	Comp.	Dubbs
Johnson Oil Ref. Co., Cleveland	5,000	2,750	S-C	Dubbs
Mid-Continent Pet. Corp., West Tulsa	40,000	20,000	Comp.	Own
Pepper Gasoline Co., Oklahoma City	500	.....	S	
Phillips Pet. Co., Okmulgee	6,000	1,500	S-C-L	Dubbs
Rock Island Ref. Co., Beckett	7,500	4,000	S-C-A	Winkler-Koch

OKLAHOMA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Sinclair Ref. Co., Sand Springs	6,000	3,000	S-C-L-W	Cross
Sun Oil Co., Yale	5,000	.....	S	
Sunray Oil Co., Allen	7,500	3,500	S-C-A	Dubbs
Texas Co., West Tulsa	16,000	15,600	Comp.	Holmes-Manley Pressure Coke
Tide Water Associated Oil Co., Drumright	12,000	7,000	S-C	Tube & Tank
Wilcox, H. F., Oil & Gas Co., Bristow	5,000	2,200	S-C	Dubbs
Total	200,500	101,300		

PENNSYLVANIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Atlantic Ref. Co., Philadelphia	83,000	21,900	Comp.	Lewis, Cross, De Florez Combination
Bradford Oil Ref. Co., Bradford	2,500	900	S-C-L-W	True Vapor Phase
Berry, James B., Sons Co., Inc., Oil City	2,500	450	Comp.	Dubbs
Bradford Penn Ref. Corp., Clarendon	2,000	.....	S-L-W	
Canfield Oil Co., Coraopolis	1,500	.....	S	
Cities Service Oil Co. (Pa.), Titusville	3,000	.....	S-L-W	
Conewango Ref. Co., Warren*	.....	.....	L	
Continental Ref. Co., Oil City	1,000	250	S-C-L-W	Dubbs
Daugherty Ref., Petrolia	2,000	.....	S-L	
Franklin Creek Ref. Corp., Franklin	2,000	.....	S-L	
Freedom Oil Co., Freedom	2,500	600	S-C-L-W	Dubbs
Gulf Oil Corp., Philadelphia	30,000	12,000	S-C-L	Gulf
Gulf Oil Corp., Pittsburgh	10,000	3,000	S-C-L	Gulf
Kendall Ref. Co., Bradford	4,000	2,200	S-C-L-W	Dubbs
Oil Creek Ref. Co., Titusville	1,750	.....	S-L-W	
Penna. Oil Prod. Ref. Co., Eldred	5,000	1,750	Comp.	Own
Pennsylvania Ref. Co., Karns City	1,500	.....	S-L-W	
Pennsylvania Ref. Co., Titusville	1,800	.....	S-L-W	
Pennzoil Co., Oil City	.....	7,000	C	Dubbs
Pennzoil Co., Rouseville	10,000	.....	S-L-W	
Pure Oil Co., Marcus Hook†	.....	.....	L	
Quaker State Oil Ref. Corp., Emlenton	1,800	1,200	S-C-L-W	Dubbs
Quaker State Oil Ref. Corp., Farmers Valley	3,500	1,500	S-C-L-W	Dubbs
Sherwood Ref. Co., Warren	800	.....	S	
Sinclair Ref. Co., Marcus Hook	45,000	30,000	S-C-A	Sinclair 600
Sun Oil Co., Marcus Hook	82,000	30,500	Comp.	Own-Houdry
Superior Oil Works, Warren	500	.....	S-L-W	
Ultra-Penn Ref. Co., Butler	1,000	.....	S-L	
United Ref. Co., Warren	5,500	2,000	S-C-L-W	Dubbs
Valvoline Oil Co., Butler	3,000	.....	S-L-W	
Waverly Oil Works Co., Pittsburgh	2,000	.....	S-L-W	
Wolverine-Empire Ref. Co., Reno‡	2,500	5,000	S-C-L-W	Dubbs
Total	313,650	120,250		

*Runs no crude; purchases raw stocks.

†Blending and compounding only.

‡Operated under joint ownership of Pennzoil, Quaker State and Continental Ref. Co.

RHODE ISLAND

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Socony-Vacuum Oil Co., Inc., Providence	9,000	1,650	S-C-A	
Texas Co., Providence	3,500	.....	S-A	
Total	12,500	1,650		

SOUTH CAROLINA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Standard Oil Co. of N. J., Charleston	5,000	.....	S-A	
Total	5,000	.....		

SOUTH DAKOTA

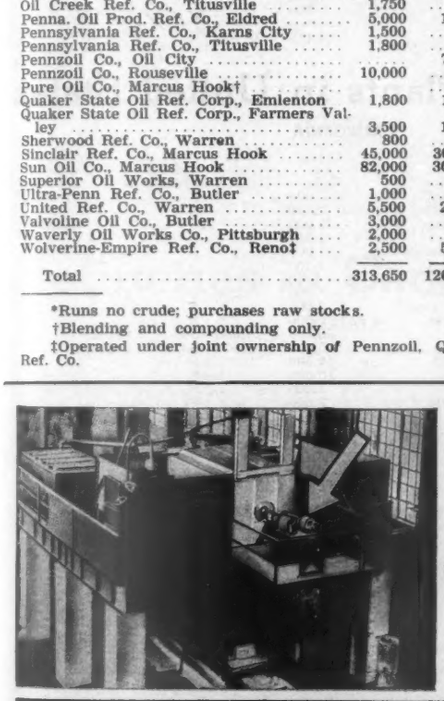
Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Hot Springs Ref. Co., Hot Springs	180	.....	S	
Rex Oil Refinery, Rapid City	200	.....	S	
Sturgis Ref. Co., Sturgis	50	.....	S	
Total	430	.....		

TENNESSEE

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Russell Producing Co., Sunbright	150	.....	S	
Total	150	.....		

TEXAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Aero Gas Ref. Co., Fort Stockton	350	.....	S	
American Pet. Co., Houston	10,000	.....	S	
Amsco Ref. Co., Corpus Christi	12,000	.....	S	
Atlantic Ref. Co., Atreco	22,600	8,000	S-C	Combination
Baird Ref. Co., Baird	1,500	1,200	S-C	Own
Bareco Oil Co., Corpus Christi	10,000	5,500	S-C	Dubbs
Bryson Pipe Line & Ref. Co., Bryson	1,800	.....	S-L	
Coastal Refineries, Inc., Port Isabel	6,000	.....	S	Rowsey Viscosity Breaking
Coleman Ref. Co., Coleman	600	.....	S	
Col-Tex Ref. Co., Colorado City	12,000	4,000	S-C-A	Dubbs
Continental Oil Co., Wichita Falls	5,000	2,500	S-C	Cross
Cosden Pet. Corp., Big Spring	16,000	14,000	S-C-L	Dubbs
Cosden Pet. Corp., Graham	3,000	.....	S-L	
Crown Central Pet. Corp., Houston Ship Channel	16,000	6,000	S-C-L	Holmes-Manley
Danube Oil Corp., Borger	500	.....	S	
Eastern States Pet. Co., Inc., Houston	18,000	10,000	S-C	
East Texas Ref. Co., Longview	10,000	5,000	S-C	Donnelly
Falls Ref. Co., Inc., Wichita Falls	2,500	.....	S	
Gratex Ref. & Fuel Oil Co., Graham	500	.....	S	
Gulf Oil Corp., Port Arthur	125,000	50,000	S-C-L-W	Gulf



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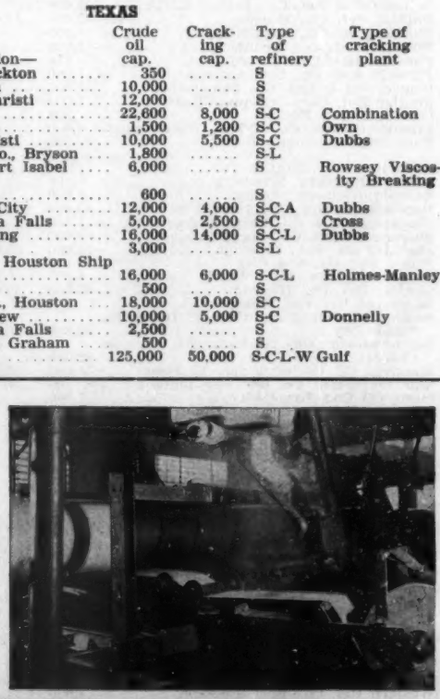

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TEXAS (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Gulf Oil Corp., Fort Worth	6,000	3,000	S-C	Gulf
Gulf Oil Corp., Sweetwater	6,000	2,500	S-C	Gulf
Heffington Pet. Co., Austin	200	.....	S	
Houston Oil Co. of Tex., Viola	500	.....	S	
Howard County Ref. Co., Big Spring	2,000	.....	S	
Humble Oil & Ref. Co., Baytown	140,000	90,000	S-C-L	Tube & Tank Cross
Humble Oil & Ref. Co., Ingleside	25,000	20,000	S-C	Tube & Tank
Humble Oil & Ref. Co., Neches	5,000	.....	S	
Humble Oil & Ref. Co., San Antonio	5,000	.....	S	
Hurricane Pet. Corp., Overton	5,000	3,000	S-C	Sinclair
Independent Ref. Co., Arp	3,500	1,500	S-C	Own
Jacksboro Ref. Co., Jacksboro	250	.....	S	
La Salle Pet. Co., Burkburnett	2,500	.....	S	
Lynch Ref. Co., Gladewater†	3,000	.....	S	
Lynch Ref. Co. (Plant No. 2), Kilgore	5,000	3,000	S-C	Own
Lynch Ref. Co. (Lynch refinery), Kilgore*	2,500	1,800	S-C	Peterson
McMurrey Pet. Corp., Tyler	10,000	3,000	S-C	Dubbs
Magnolia Pet. Co., Beaumont	100,000	61,000	S-C-L-W	Houdry, Cross
Magnolia Pet. Co., Corsicana	5,000	.....	S	
Magnolia Pet. Co., Fort Worth	5,800	3,500	S-C	Cross
Magnolia Pet. Co., Luling	6,500	5,500	S-C	Controlled Coil
Maritime Oil Co., Houston	5,000	.....	S	
Motor Fuels Corp., Levelland	3,000	3,000	S-C	Dubbs
Moutray Oil Co., Hawley	1,250	.....	S	
Muenster Ref. Co., Muenster	2,000	.....	S	
North Texas Ref. Co., Gainsville	600	.....	S	
Ohio Oil Co., Fort Worth	4,500	1,500	S-C-L-W	Kellogg
Olney Oil & Ref. Co., North Olney	3,000	1,500	S-C	Donnelly
Onyx Ref. Corp., Abilene	2,000	.....	S	
Pan American Ref. Corp., Texas City	79,000	79,000	S-C	Combination
Panhandle Ref. Co., Lueders	1,500	800	S-C	Dubbs
Panhandle Ref. Co., Wichita Falls	4,200	2,000	S-C	Dubbs
Payward Ref. Co., Shamrock	1,000	.....	S	
Pettus Oil & Ref. Co., Pettus	1,000	.....	S	
Phillips Pet. Co., Borger	35,000	17,000	S-C	Own
Phillips Pet. Co., Penwell	1,000	.....	S	
Phoenix Ref. Co., Bruni	1,000	.....	S	
Phoenix Ref. Co., Houston	750	.....	S	
Phoenix Ref. Co., San Antonio	1,200	.....	S	
Pioneer Oil & Ref. Co., Somerset	2,000	.....	S-L-A	
Pontiac Ref. Corp., Corpus Christi	7,000	.....	S	
Post Ref. Co., Rotan	800	.....	S	
Premier Oil Ref. Co. of Tex., Willow Spgs.	4,000	2,000	S-C	Own
Pure Oil Co., Nederland	59,000	31,000	S-C	Cross, Comb. High Pressure
Rado Ref. Co., McAllen	1,000	.....	S-A	
Refugio Refinery, Edinburg	1,200	.....	S	
Refugio Refinery, Refugio	1,500	.....	S	
Republic Oil Ref. Co., Texas City	20,000	3,000	S-C	Winkler
Shamrock Oil & Gas Corp., Lefors	1,500	.....	S	
Shamrock Oil & Gas Corp., Sunray	3,000	3,000	S-C	Dubbs
Shell Oil Co., Inc., Houston	74,000	52,000	S-C	Dubbs
Shelly Ref. Co., Bay City	1,100	600	S-C	Own
Sinclair Ref. Co., Fort Worth	4,000	3,000	S-C	Sinclair 600
Sinclair Ref. Co., Houston	60,000	44,000	S-C-L	Sinclair 600
Southland Ref. Co., Olney	500	.....	S	
Southport Petroleum Co. of Delaware, Texas City	20,000	20,000	Comp.	
Southwestern Oil & Ref. Co., Corpus Christi	12,000	.....	S	
Standard Oil Co. of Texas, El Paso	14,000	5,000	S-C	Dubbs
Star Light Ref. Co., Inc., Ballinger	500	.....	S	
Stone Oil Co., Texas City	7,500	.....	S	
Talco Asphalt & Ref. Co., Mount Pleasant	8,000	2,500	S-C-A	Dubbs
Taylor Ref. Co., Corpus Christi	20,000	.....	S	Rowsey Viscosity Breaking
Taylor Ref. Co., Taylor	5,000	.....	S	Rowsey Viscosity Breaking
Terminal Ref. Corp., Corpus Christi	12,000	.....	S	
Texas Co., Amarillo	7,000	4,000	S-C	De Florez Pressure Coke
Texas Co., El Paso	2,000	2,000	S-C	Holmes-Manley
Texas Co., Houston	25,000	2,500	S-C	Tube & Tank
Texas Co., Port Arthur	135,000	107,000	Comp.	Holmes-Manley De Florez, Pressure Coke
Texas Co., Port Neches	36,000	.....	S	
Texas Co., San Antonio	5,000	5,000	S-C	Holmes-Manley
Texas Co., West Dallas	20,000	14,000	S-C	Holmes-Manley De Florez, Pressure Coke
Three Rivers Ref., Three Rivers	1,000	.....	S-L-A	
Valley Ref. Co., Harlingen	1,000	.....	S	
Waggoner Ref. Co., Electra	6,000	3,000	Comp.	Dubbs
Western Ref. Co., Fort Stockton	1,000	.....	S	
Wickett Ref. Co., Wickett	2,000	.....	S	
Total	1,339,700	712,400		

*Leased from Roger Lacy.
†Leased from Gladewater Ref. Co.

UTAH

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Utah Oil Ref. Co., Salt Lake City	7,500	7,200	Comp.	Modified Holmes-Manley
Wasatch Oil Ref. Co., Woods Cross	1,500	800	S-C	Vapor Phase
Total	9,000	8,000		

VIRGINIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Texas Co., Norfolk	2,000	.....	S-A	
Total	2,000	.....		

WASHINGTON

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Inland Empire Refineries, Inc., Spokane	2,200	1,100	S-C-A	Winkler-Koch
Total	2,200	1,100		

WEST VIRGINIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Elk Ref. Co., Falling Rock	3,000	1,000	S-C-L-W	Dubbs
Pure Oil Co., Cabin Creek	4,000	2,800	S-C-L-W	Comb. High Pressure
Quaker State Oil Ref. Corp., St. Marys	2,000	1,200	S-C-L-W	Dubbs
Total	9,000	5,000		

WISCONSIN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Wisconsin Oil Ref. Co., Wilson*	5,000	2,500	S-C	Dubbs
Total	5,000	2,500		

*Building.

WYOMING

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Bay Pet. Corp., Cheyenne	1,500	.....	S	
C. & H. Refinery, Lusk	100	.....	S	
Continental Oil Co., Glenrock	2,800	1,800	S-C	Cross
Consumers Oil & Ref. Co., Newcastle	1,200	.....	S	
Crook County Refinery, Sundance	100	.....	S	
Dilger, F. G., Newcastle	100	.....	S	
Elk Horn Gas Refinery, Osage	55	.....	S	
Gray Refinery, Inc., Newcastle	400	.....	S	
Moorcroft Ref. Co., Moorcroft	63	.....	S-L	
Northwestern Pet., Newcastle	100	.....	S	
Ohio Oil Co., Lovell	2,500	.....	S-A	
Pilot Oil Co., Morton	100	.....	S	
Resolute Oil Corp., Badger Basin	1,000	300	S-C	
Sinclair Ref. Co., Parco	8,000	7,000	S-C	Sinclair 600
Socony-Vacuum Oil Co., Inc., Casper	5,000	1,000	S-C-A	
Standard Oil Co. (Ind.), Casper	13,600	3,800	Comp.	Vapor Phase
Standard Oil Co. (Ind.), Greybull	4,400	1,000	S-C-A	Cross
Texas Co. (Calif. Pet. Corp. of Utah), Calpet	300	.....	S	
Texas Co., Casper	7,000	7,200	S-C	Holmes-Manley Pressure Coke
Texas Co., Cody	3,000	.....	S-A	
Tri-State, Inc., Thermopolis	1,000	.....	S	
Yale Oil Corp., Lovell	1,500	.....	S	
Yale Oil Corp., Worland	600	.....	S	
Total	54,418	22,100		

Shutdown Plants in United States

CALIFORNIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cascade Oil & Ref. Co., Bandini	5,000	.....	S	
Cascade Oil & Ref. Co., Playa Del Rey	1,300	.....	S	
Cascade Oil & Ref. Co., Torrance	2,000	.....	S	
Cole Ref. Co., Seal Beach	2,500	.....	S	
General Pet. Corp. of Calif., Vernon	28,000	.....	S	
Gilmore Oil Co., Los Angeles	1,500	.....	S-A	
Interstate Oil Corp., Taft*	250	.....	S	
Rice Ranch Oil Co., Santa Maria	500	200	S-C	Clark T.V.P.
Walter Steiner Ref. Co., Long Beach	2,000	.....	S	
Richfield Oil Corp., Bakersfield	2,000	.....	S	
Richfield Oil Corp., Hynes	55,000	14,000	S-C	Cross
Richfield Oil Corp., Vinvale	10,000	3,600	S-C	Sinclair
Telegraph Ref. Corp., Compton	1,500	.....	S	
Union Oil Co., Avila	10,000	.....	S	
Union Oil Co., Santa Paula	1,200	.....	S	
Yosemite Oil Ref. Co., Fruitvale	1,500	.....	S	
Total	124,250	17,800		

COLORADO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
McGarr Pet. Corp., Kline	180	.....	S	
Midland Oil Ref. Co., Denver	1,000	.....	S	
Total	1,180	.....		

KENTUCKY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Central Oil Co., Glasgow	250	.....	S	
Total	250	.....		

LOUISIANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Shoreline Oil Co., Shoreline	5,000	2,200	Comp.	
Total	5,000	2,200		

MICHIGAN

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Sovereign Ref. Co., Saginaw	500	.....	S	
Total	500	.....		

MONTANA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Arro Oil & Ref. Co., Lewistown	1,000	500	S-C	Dubbs
Deloraine Ref. Co., Oilmont	225	.....	S	
Lake County Refinery, Polson	50	.....	S	
Total	1,275	500		

OHIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Johnson, A. L., Wayne	65	.....	S	
Montgomery, H. A., Co., Inc., Findlay	500	.....	S-L-A	
Total	565	.....		

OKLAHOMA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Cities Service Oil Co. (Del.), Okmulgee	4,000	1,200	S-C-L-W	Doherty
Cosco Oil Co., Wynnewood	2,000	1,200	S-C-A	Dubbs
Eason Oil Co., Enid	5,000	.....	S-L	
Globe Oil & Ref. Co. (Okla.), Blackwell	8,000	4,000	S-C	Winkler-Koch
Illinois Oil Co., Cushing	3,000	1,500	S-C	

OKLAHOMA (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Knox Ref. Co., Covington	500	.....	S	
Omar Ref. Co., Garber	5,000	2,000	S-C	
Pilgrim, Inc., Kingston	50	50	S-C-L	
Pure Oil Co., Muskogee	9,000	.....	S	Cross Comb. High pressure
Total	36,550	9,950		

TEXAS

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Allstate Ref. Co., Thrall	2,000	.....	S	
Beacon Oil & Ref. Co., Henderson	4,500	.....	S	
Hurricane Pet. Corp., Arp*	3,000	1,800	S-C	Sinclair
Macmillan Pet. Corp., Borger	8,000	.....	S	
Minerva Ref. Co., Minerva	1,000	.....	S	
Mockley Pet., Co., Fry	170	.....	S	
Model Oil & Ref. Co., Kilgore*	2,500	2,500	S-C	Donnelly
Paluxy Asphalt Co., Mankins	1,500	.....	S	
Rusk Oil & Ref. Co., Overton	3,500	.....	S	
Sinclair Ref. Co., Gladewater	4,000	.....	S	
Tucker Oil Co., Burkburnett	250	.....	S	
Master Pet. Co., Waco	1,000	.....	S	
Mertzon Ref. Co., Mertzon	200	.....	S	
Phoenix Ref. Co., Pettus	1,000	.....	S	
Total	32,620	4,300		

*Temporarily shut down.

UTAH

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Baker Pet. Corp., Virgin*	200	.....	S	
Utah Parks Pet. Co., Virgin	100	.....	S	
Total	300	.....		

*Leased from Diamond Oil Co.

WYOMING

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Beck, G. T., Refinery, Cody	500	.....	S-A	
Whitman, A. J., Leroy	200	.....	S	
Total	700	.....		

Refineries in Canada

ALBERTA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Becker Refineries, Ltd., Royalties	.....	.....	....	
British American Oil Co., Ltd., Calgary	5,000	2,500	S-C-A	
Dina Oil & Ref. Co., Ltd., Dina	.....	.....	....	
Fraser, J. W., Ref. Co., Wainright	100	.....	S	
Gas & Oil Products, Ltd., Hartell	2,500	600	S-C	Dubbs
Gold Standard Oils, Ltd., Wainright	300	.....	S-A	
Hi-Way Refineries, Ltd., South Edmonton	400	.....	S	
Huff Ref. Co., Ltd., Lethbridge	500	.....	S	
Hydro-Pete Oils, Ltd., Red Deer	.....	.....	....	
Imperial Oil, Ltd., Calgary	6,000	4,400	S-C-L-A	Tube & Tank
Lion Ref. Co., Calgary	600	.....	S	
Munro, J. R., Hubalta	.....	.....	....	
Okotoks Oil & Ref. Co., Ltd., Okotoks	.....	.....	....	
Oughton Bros., Turner Valley	100	.....	S	
Total	*17,000	7,500		

*Estimated.

BRITISH COLUMBIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Home Oil Distributors, Ltd., N. Vancouver	1,000	.....	S	
Imperial Oil, Ltd., Ioco	16,000	3,400	S-C-L-A	Tube & Tank
Shell Oil Co. of B. C., Shellburn	3,800	.....	S	
Standard Oil Co. of B. C., Ltd., Burnaby	2,000	.....	S	
Total	22,800	3,400		

MANITOBA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Anglo-Canadian Oils, Ltd., Brandon	1,200	700	S-C-A	Dubbs
Carman Oil Ref., Ltd., Carman*	250	.....	S	
Mid-West Refineries, Ltd., Dauphin	200	.....	S	
North Star Oil, Ltd., Winnipeg	800	.....	S	
Total	2,450	700		

*Shut down.

NEW BRUNSWICK

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
New Brunswick Gas & Oilfields, Ltd., Weldon	.....	.....	....	
Total	*300	.....		

*Estimated.

NORTHWEST TERRITORY

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Imperial Oil, Ltd., Fort Norman	100	.....	S	
Northwest Co., Ltd., Fort Norman	.....	.....	....	
Total	*400	.....		

*Estimated.

NOVA SCOTIA

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Imperial Oil, Ltd., Dartmouth	20,000	12,500	S-C-A	Tube & Tank
Total	20,000	12,500		

ONTARIO

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Toronto	6,000	3,000	S-C	
Burlington Refineries, Ltd., Hamilton*	600	.....	S	
Canadian Oil Co., Ltd., Petrolia	3,000	2,000	S-C	U.O.P.
Good Rich Ref. Co., Ltd., Port Credit	2,500	1,000	S-C	Dubbs
Imperial Oil, Ltd., Sarnia	26,000	15,600	Comp.	Tube & Tank
McColl-Frontenac Oil Co., Ltd., Toronto	11,000	7,000	S-C	
Total	49,100	28,600		

*Shut down.

QUEBEC

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Montreal	12,000	7,500	S-C-A	
Champlin Oil Products, Ltd., Montreal	2,500	.....	S	
Gen. Pet. Refineries, Pointe-aux-Trembles	.....	.....	....	
Imperial Oil, Ltd., Montreal	25,000	11,500	S-C-A	Tube & Tank

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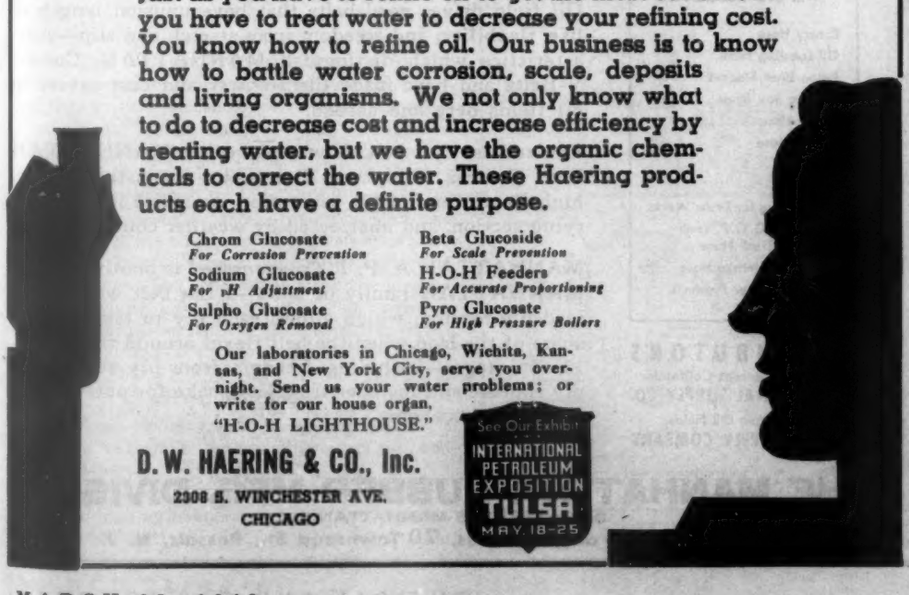

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QUEBEC (Continued)

Company and plant location—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
McColl-Frontenac Oil Co., Ltd., Montreal	18,000	11,000	S-C	
Shell Oil Co. of Canada, Ltd., Montreal	7,000	5,500	S-C	Dubbs Comb.
Total	*64,800	35,500		

*Estimated.

SASKATCHEWAN

Company and plant relation—	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
British American Oil Co., Ltd., Moose Jaw	4,000	2,000	S-C-A	
Consumers Co-op. Ref., Regina	500	*800	S-C	Dubbs
Eston Ref. Co., Ltd., Eston	300	.....	S	
Hi-Way Refineries, Ltd., Moose Jaw	350	.....	S	
Hi-Way Refineries, Ltd., Regina	250	.....	S	
Hi-Way Refineries, Ltd., Regina	400	.....	S	
Hi-Way Refineries, Ltd., Rosetown	250	.....	S	
Hi-Way Refineries, Ltd., Swift Current	250	.....	S	
Hi-Way Refineries, Ltd., Saskatoon	300	.....	S	
Hi-Way Refineries, Ltd., Prince Albert	250	.....	S	
Hi-Way Refineries, Ltd., Weyburn	250	.....	S	
Home Oil & Ref. Co., Ltd., Humboldt	400	.....	S	
Imperial Oil, Ltd., Regina	6,500	2,300	S-C-A	Tube & Tank
Natural Sodium Products, Ltd., Bishopric	1,000	.....	S	
Northern Pet. Corp., Ltd., Kamsack	200	.....	S	
Sterling Ref., Ltd., Yorkton†	500	.....	S	
Total	15,700	5,100		

*Dubbs after June 1, 1940. †Shut down.

Refineries in Mexico

	Crude oil cap.	Cracking cap.	Type of refinery	Type of cracking plant
Petroleos Mexicanos, Ciudad Madero	45,000	12,000	Comp.	Dubbs-G
Petroleos Mexicanos, Arbol Grande	15,000	.....	S-L-W	
Petroleos Mexicanos, Bella Vista	1,400	1,100	S-C	Dubbs
Petroleos Mexicanos, Mata Redonda	8,500	5,500	S-C	Kellogg
Petroleos Mexicanos, Poza Rica	7,500	.....	S	
Petroleos Mexicanos, Minatitlan*	22,000	2,500	Comp.	Dubbs
Petroleos Mexicanos, Mexico City	14,500	.....	S	
T. Meza Moreno, P. y Aguacate	315	.....	S	
Refinerias Mexico, Nuevo Laredo	330	.....	S	
Refineria Villarreal, Nuevo Laredo†	50	.....	.....	
Refineria Laredo, Nuevo Laredo	190	.....	S	
Refineria Union, Monterrey	160	.....	S	
Refineria del Norte, Cd. Juarez	1,000	.....	S	
Total	115,945	21,100		

*Operating skimming unit only. †Experimental plant.

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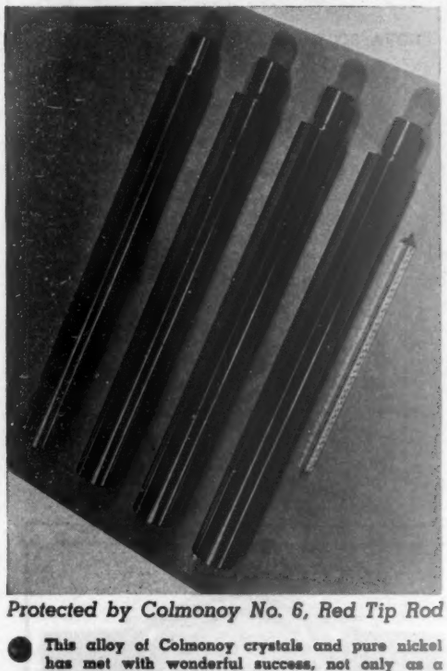

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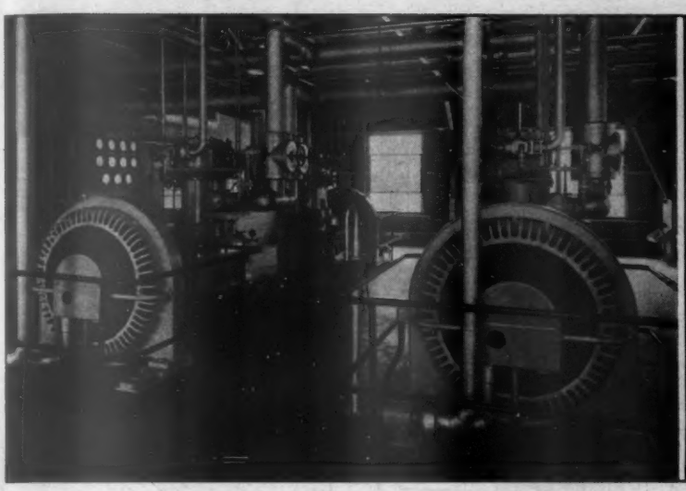
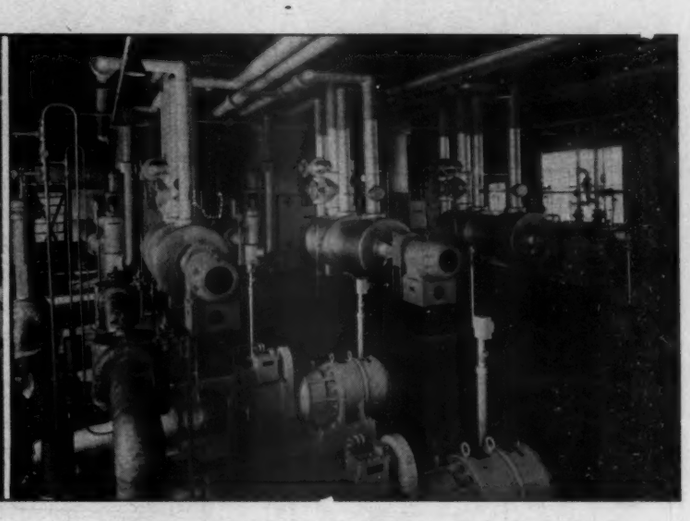


Interior view of refrigerator-compressor room



Interior view showing chillers, contactors, pumps and controls

Treating High-Sulfur Cracked Distillate With Acid Process

By F. A. APGAR
Research and Development Department, Sinclair Refining Co.

and C. A. DAY, JR.
Development Department, Richfield Oil Corp.

DURING 1939 a Stratcold treating plant, incorporating the latest improvements, was installed at the Watson refinery of the Richfield Oil Corp. in California. Completion of this unit has brought the refinery operations to a point where flexible and economic control of the sulfur content of finished gasoline is readily maintained. Precise control is essential since the refinery processes California crudes rich in sulfur compounds.

In the refining procedure, cracked distillate is split into a heavy and light fraction by the usual debutanizing and stabilizing operations. The heavy fraction, having a boiling range of 220° F. to 410° F., contains the refractory sulfur compounds and is subjected to the treatment; the light fraction contains sulfur compounds which are satisfactorily removed by caustic washing. The acid-treated distillate is rerun and the overhead blended with the caustic washed light fraction for sweetening.

The flow of the process is diagrammatically shown. Briefly, cracked distillate is contacted in three stages with countercurrent flow of acid. The treated distillate is then passed upward through a clarifier or rock-packed tower for further separation of acid sludge, thence water washed, and finally neutralized with caustic soda solution.

The plant was designed to treat 11,000 bbl. per day of heavy cracked naphtha with 9 lb. of 98 per cent sulfuric acid per barrel of naphtha with temperatures on the stages maintained at 30° F., 30° F., and 20° F., respectively. Stratford Engineering Corp. designed and constructed the plant in close cooperation with the Richfield-Sinclair engineering departments so that the plant conforms to the Richfield-Sinclair design and construction standards.

Treating Stage

Each stage of the treating process comprises a chiller, a horizontal refrigerating contactor, and a sludge settler.

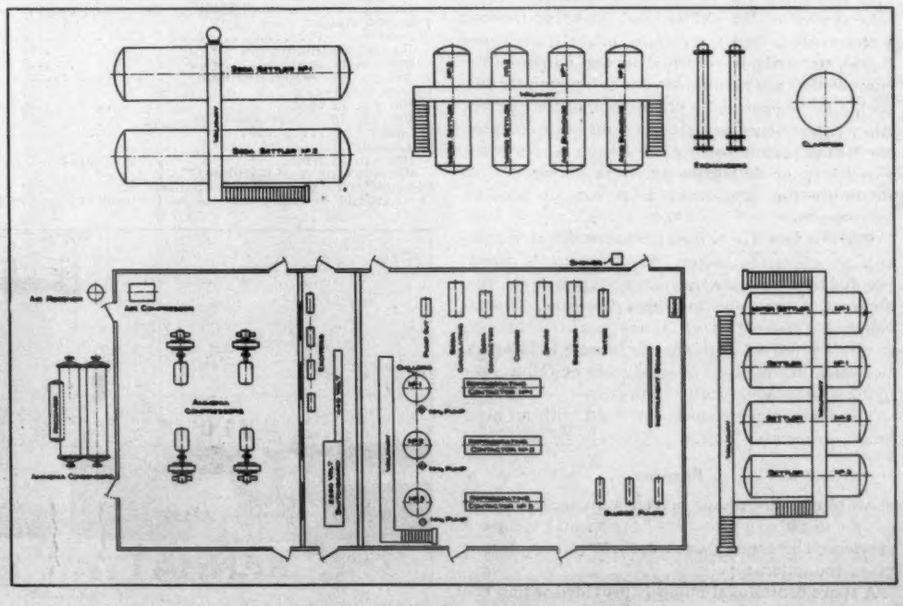
The distillate before passage to the contactor is cooled to treating temperature in the chiller which is the shell and coil type, arranged with liquid level control to maintain a constant level of ammonia in the bottom portion. A clear nonfrosting gage glass provides a visible check of this level.

In the refrigerating contactor, acid and distillate are rapidly circulated by an impeller over tubes cooled by ammonia. Thus, in one operation, acid and distillate are intimately mixed and the heat of reaction removed as rapidly as produced. Ammonia is supplied to the tubes by a vertical, centrifugal pump (mounted on the chiller) which pumps liquid ammonia from the base of the chiller through the refrigerating head of the contactor back to the ammonia vapor zone of the chiller.

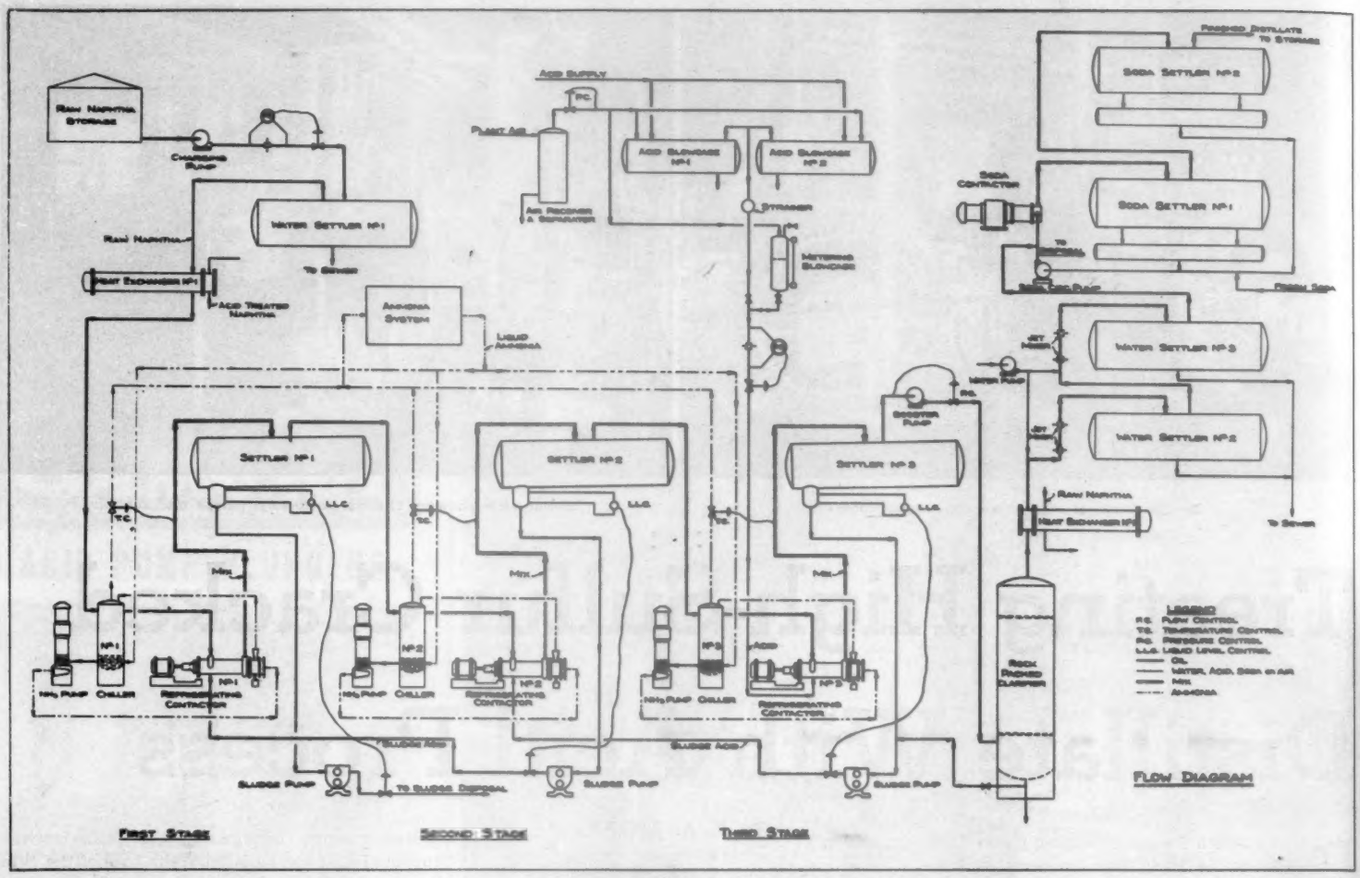
Settlers

All settlers are Stratco design incorporating special decelerating features and are protected by relief valves.

The initial settler, sludge settlers, clarifier and soda settlers are steel vessels designed and constructed in accordance with the A.P.I.-A.S.M.E. code for unfired pressure vessels with ⅛-in. corrosion allowance. The two water settlers for separation of acid water are designed and constructed



Plot plan showing layout of equipment



Flow diagram as used in the Richfield refinery

of Everdur bronze with $\frac{1}{16}$-in. corrosion allowance.

Refrigeration

Heat exchange is provided between the raw feed and the cold acid-treated distillate, as it leaves the clarifier, to reduce the refrigeration load. This load is further reduced by adequate covering of cold lines and vessels with vegetable cork insulation.

Four vertical, two-cylinder ammonia compressors constitute the refrigerating capacity. These take suction on the chillers and discharge through water coolers into a receiving drum from which liquid ammonia is returned to the chillers. The compressors are manifolded in such a manner that each may be operated with any one of the chillers. Also, adjustments are provided on each compressor which permit setting the output at one-third, two-thirds, or full capacity, thus giving desired flexibility for adjustment with varying load requirements.

Each compressor is directly connected to a 2,300-volt synchronous motor. Each motor is vapor-proofed by a separate fresh-air system which forces air through the collecting-ring enclosures. This air supply is assured at all times since the motors cannot be started until the air blower is in operation, and, in the event of an air-blower failure, the motors are automatically stopped.

The ammonia system is provided with an automatic air-purging unit.

Pumps

All pumps are motor driven with the exception of one steam pump provided for special pump-out service. The motors used are 440-volt explosion-proof induction type.

A spare centrifugal pump is provided which can

(Continued on Page 243)

TABLE 1—TEST RUN DATA

Commercial test number	1	2	3	4	5	6	7
Number of days	5	3	5	7	15	14	14
Rates, lb./bbl.:							
Acid	6.54	6.57	5.08	4.43	4.53	4.54	3.92
Caustic soda	. .	.20	.11	.07	.07	.06	.06
Temperature, °F.:							
First stage	30	40	40	40	50	60	60
Second stage	30	30	30	40	50	60	60
Third stage	20	20	20	30	40	50	50
Capacity and losses:							
Treated distillate, per cent	96.27	95.51	96.55	96.49	97.14	96.92	97.29
Net yield, 400 e.p. treated distillate, per cent	93.05	92.73	93.92	93.64	93.61	93.38	93.98
Treating loss,per cent	3.73	4.49	3.45	3.51	2.86	3.08	2.71
Polymer loss, per cent	1.81	1.82	1.74	2.07	2.34	2.15	2.05
Mercaptan sulfur—Mgs./100 cc.:							
400 e.p. in feed	50	50	50	50	50	50	50
400 e.p. in treated distillate	2	4	5	6	15	10	14
Per cent sulfur:							
Feed	.630	.663	.671	.671	.648	.641	.678
Treated distillate	.423	.431	.451	.504	.495	.445	.492
400 e.p. in feed	.600	.636	.643	.651	.618	.613	.633
400 e.p. in treated distillate	.248	.248	.329	.337	.315	.272	.340
Octane number:							
400 e.p. in feed	....	....	....	....	68.2	67.9	68.6
400 e.p. in treated distillate	....	....	....	....	67.1	67.0	67.7
Loss	....	....	....	....	1.1	0.9	0.9
C.D. gum:							
400 e.p. in feed	146	....	....	....	450	500	486
400 e.p. in treated distillate	5	....	....	....	20	37	22
Color of 400 e.p. in treated distillate	30	30	30	30	30	30	30

It should be noted that the sulfur removal on the above treats is not on the same reduction basis.

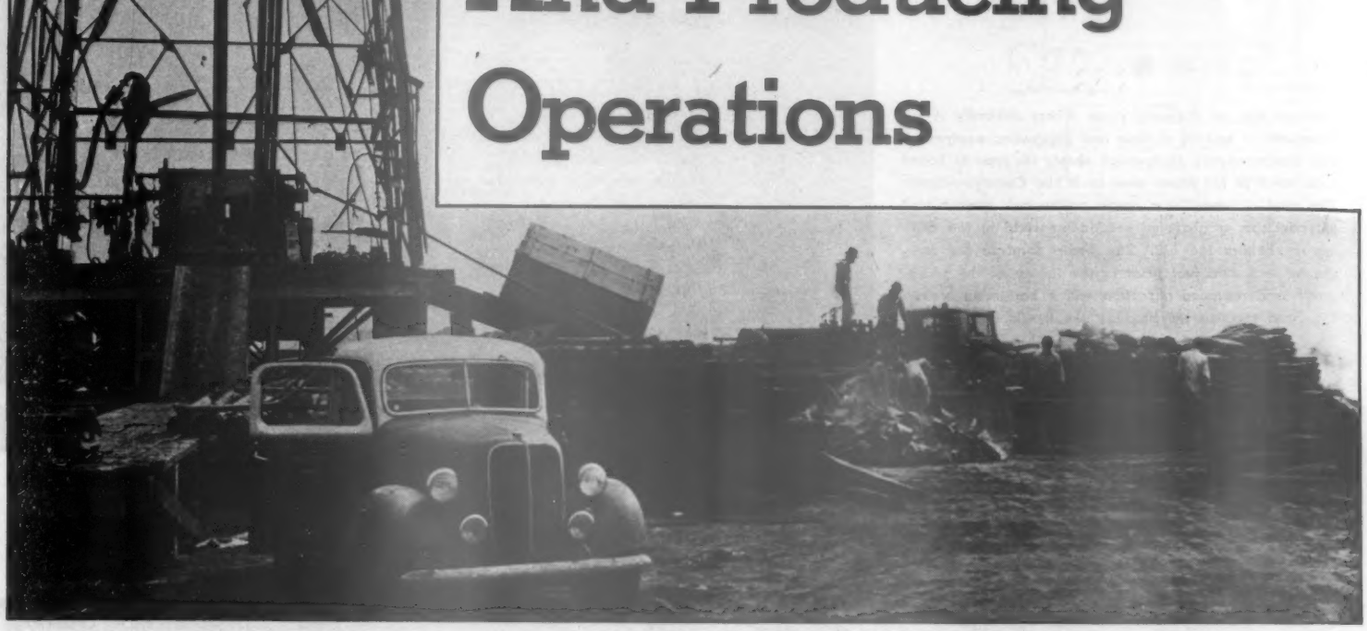
Exterior rear view of Stratcold acid-treating plant in the new Watson, Calif., refinery of Richfield Oil Corp.

Swamps are not the only place where difficulty is encountered in moving drilling and production equipment. The accompanying photograph shows the type of board road used in the Irons pool in White County, Illinois. The road is made from rough native oak lumber and extends from a graveled section-line road to the drilling rig behind the hill. The board road in the foreground was laid just prior to the taking of the photograph and replaced a section which had been broken and sunk in the mud by the traffic over it

ENGINEERING & OPERATING

MARCH 28, 1940

Chemicals in Drilling And Producing Operations



The chemical control in the manufacture and use of cements has made the successful completion of deep wells possible

By W. W. ROBINSON
Chief Chemist, Production Department, Gasoline Division, The Texas Co. (California)

IN the past 10 years drilling and producing operations have uncovered problems the solution to which cannot be obtained by wholly mechanical procedures. High subsurface temperatures[25] and their effect on drilling fluids[26] and cements, hydratible shales, salt deposits, lost circulation, increasing the permeability of limestone and a host of other obstacles tax the resourcefulness and ingenuity of the driller. In particular, deep drilling has demanded that every art and science be brought to bear, directly or indirectly, on many questions the answers to which will assist in making the search for oil more scientific. In 1932 only one well in the United States[27] was drilled deeper than 10,000 ft.; while in 1939, 215 wells exceeded 10,000 ft.

It is, therefore, not surprising that chemistry and chemical engineering are being applied to certain drilling and producing problems with the intent to lending material assistance. . . . In less than 5 years strides have been made in many directions which have served to convince even the most skeptical that chemistry has come into the oil field to stay. So with the chemist as a new member of the production department of the oil business it may be of interest to examine broadly, in terms of the United States oil industry as a whole, along what lines his ingenuity is finding practical expression.

Drilling Mud

It is no overstatement to say that the growth in knowledge about drilling mud has been phenomenal in the past 5 years, even though a great deal remains to be learned. Since the days when a mud was spoken of as "slick" have come valuable insights into the nature of a mud-making material. For instance, it is now known that ultimate clay particles in mud-making clays are plate-like crystallites stacked together[8]; and that bentonite swells because water pries the plates apart to release plate-like particles which have the capacity to interfere with each other and the flow of the liquid in which they are present.[9]

More is now known about the composition of clays and shales and the surface chemistry of clay minerals[9] and important factors such as the retention of water, ionization and base exchange, cohesion and gelling, and the effect of chemicals are receiving careful study. As knowledge increases, newer definitions will be forthcoming which will add further significance to the fundamental properties of a mud in relation to its ability to remove cuttings, hold the cuttings when quiescent, contribute necessary hydrostatic pressure, lubricate the tools, and lay down a thin cake with a low water loss. . . .

Incorporation of bentonite in mud.—Long before the oil industry became interested in mud properties much time and money were lost through one difficulty alone, the "breaking" of muds with the separation of free water and the rapid settling of solids. Many cases of stuck tools and stuck casing have been directly attributable to the properties of the mud used. Added to this unhappy state of affairs was the difficulty of maintaining proper circulation and shutdown periods when out of the hole were events to be dreaded. To solve this difficulty a colloidal clay known as bentonite[41] come into use which possesses the property when wet, of forming a slimy, unctuous mass with a marked capacity for holding noncolloidal particles in suspension. It was found that by adding from 2 to 5 per cent of bentonite to a mud-laden fluid with a suspendable clay base, a drilling fluid could be built up which would resist a majority of the changes which had formerly caused the solid and liquid phases to separate; and at the same time materially improve its wall-building and lubricating properties. . . .

Weighting of muds.—Of equal importance to a proper colloid content was the fact that high formation pressures created the problem of how to effectively prevent blowouts. The development of weighting materials such as barium sulfate and iron oxide[44] brought a new significance to the role played by mud and resulted in a tool which has received wide application. Other substances which can weight a mud but which have received little or no commercial application are litharge, lead concentrate[44] and zinc chloride in a heavy salt or calcium chloride brine.[42]

Chemical Treatment of Mud

Even the best of muds can suffer a rise in viscosity to a degree which renders them difficult to handle, increases the thickness of the cake and water loss, and materially reduces their capacity to handle gas without gas-cutting. Among the factors contributing to the increase of viscosity[47] are: (1) Accumulation of solids, (2) base exchange, (3) loss of deflocculating agents, (4) presence of flocculating agents in natural water of formation drilled, (5) temperature, and (6) the increased colloidal dispersion and hydration of natural clays and shales. Most of these difficulties can be controlled, or overcome, by the use of various chemicals—particularly those commonly spoken of as deflocculating agents. It has been shown[48] that deflocculating agents reduce the

A.P.I.—Presented before Pacific Coast district meeting at Los Angeles March 19, 1940

thickness of mud cake and the water loss, while flocculation causes the reverse. And further, a predominance of colloids contributes to a thin mud cake and low water loss.

It may be well to digress for a moment at this point to mention the difference between flocculation and deflocculation. Even thought it is taking privileges with the concepts of colloid chemistry it is safe to say that for practical purposes the colloids in a mud may be thought of as small particles which can either adhere together in bunches, or "flocs," or be scattered (dispersed) through the mud comparatively free from each other. When the colloids are bunched together in flocs it is said to be flocculated, although the term flocculation does not define degree. If some agent is added to the mud which will coat the colloids by "surface adsorption" and loose the cohesive hold they have on each other the flocs break up and the mud is said to be deflocculated although the term does not define degree.

Several different chemicals have received practical application, as deflocculants. Some of the more important are listed below:

1. *Sodium hydroxide (caustic soda).*—This material is also used occasionally to control mud alkalinity[24] and is applied as a 5 per cent solution by dissolving 20 lb. of commercial flake caustic soda in 50 gal. of water.[1] It is also used to prepare sodium tannate by using ½ to 2 lb. per pound of quebracho or chestnut extract.[1]

2. *Soda carbonate (soda ash).*—Sodium carbonate has been used to control the alkalinity (pH) of mud,[1 24 28] and to counteract free lime in cement-cut muds.[1] In the ratio of 1 lb. per barrel of water it is used to make mud from disintegratable shales.[28] In certain cases it may prove helpful in the reduction of viscosity.[28]

3. *Sodium bicarbonate.*—Sodium bicarbonate has been cited[1 2] as being helpful in the treatment of cement-cut mud. Concentrations start with 2 lb. per 50 gal. of water.[2]

4. *Sodium silicate and metasilicate.* — Small amounts of sodium silicate will deflocculate most muds while large amounts will cause flocculation.[13] Usually less than 1 per cent will deflocculate.[13] Along with its deflocculating action the silicate contributes to mud alkalinity[1]. Sodium silicate is available in a wide range of proportions of sodium oxide-to-silica. The two most popular types[2] are made up of 8.9 per cent sodium oxide and 29 per cent silica; and 28.9 per cent sodium oxide and 28.1 per cent silica respectively. Another combination with 14.5 per cent sodium oxide and 29 per cent silica is finding use in combating heaving shales.[1]

One application of sodium silicate[2] consisted of 75 lb. of sodium silicate (8.9 per cent Na_2O and 29 per cent SiO_2), 25 lb. of caustic soda and 25 lb. of quebracho dissolved in 50 gal. of water. One barrel was applied to each 300 ft. of hole made.

Deflocculating Agents

While sodium silicate in various forms[24 28] has been used, as a deflocculating agent, probably sodium metasilicate (28.9 per cent Na_2O and 28.1 per cent SiO_2) has received the widest application. It is usually made up as a 10 per cent solution (approximately 42 lb. in 50 gal. of water) and pilot tests made to determine its maximum deflocculating effect on a given mud. Tannic acid also acts well in combination with it and frequently the additional deflocculating effect of tannic acid (quebracho) in 10 per cent strength is determined after the optimum amount of metasilicate has been determined. In addition to its deflocculating effect the tannic acid serves to offset some of the metasilicate's alkalinity.

5. *Tannic acid and sodium tannate.*—Tannic acid in the form of quebracho or chestnut extract has received considerable application as a mud deflocculant both in the Gulf Coast,[28] the Pacific Coast[6] and in foreign operations.[28] The general form used is sodium tannate which is obtained by neutralizing a portion of all of the tannic acid with caustic soda. The relationship between caustic soda and tannic acid varies widely and is largely governed by the results of pilot tests. One source[1] mentions a strength of tannic acid solution falling between 10 per cent and 25 per cent with an equal quantity of caustic soda added; while another[6] gives 1 part of caustic soda to 10 parts of tannic acid. Using equal amounts of each ingredient, a combination is mentioned,[28] which consists of 12½ lb. of quebracho and 12½ lb. of caustic soda dissolved in 35 gal. of water.

On the Gulf Coast[28] mixtures of 5 per cent by weight of quebracho and 3 per cent caustic, and 5 per cent quebracho and 5 per cent caustic respectively have been used. In the deflocculation of mud prior to, or after cementing, mention[6] has been made of a flushing mixture consisting of 2 lb. of quebracho and 1 lb. of caustic soda per barrel of water.

6. *Reduction of mud-surface tension.*—The reduction of gas cutting in a mud has been cited[46] when small amounts of chemicals such as ethyl alcohol, isopropyl alcohol, isoamyl alcohol, and various esters and ketones are added to the mud stream.

7. *The complex phosphates.*—A relatively new innovation in the chemical treatment of mud has been phosphates such as trisodium phosphate and disodium phosphate act more like alkalies while the complex forms from which water has been removed by heat have sharp deflocculating effects.[14] Different complex phosphates have varying degrees of alkalinity and varying rates of reversion to other phosphate forms, but most of them not only deflocculate but have the added advantage of suppressing the formation of insoluble calcium and magnesium compounds[3] and bind up soluble calcium compounds in such a way that their thickening effect on a mud is more controllable.

8. *Sodium hexa-meta phosphate* $(NaPO_3)_6$.—This slightly acid phosphate (pH 6.8) has been used extensively as a mud thinner[1 28] in water solutions of varying concentrations. One combination which has found application in Texas[7] consists of 50 lb. of sodium hexa-meta phosphate and 2 lb. of caustic soda dissolved in 50 gal. of water.

9. *Sodium tetraphosphate* $(Na_6P_4O_{13})$. — This phosphate has a slight alkalinity and exhibits a good deflocculating effect.[1 6 14 28] It can also be used in conjunction with sodium silicate.[1] In addition to a good deflocculating effect it is chemically stable in solution; does not readily revert to orthophosphate; and overtreatment does not adversely affecte a mud.[14] A 5 per cent or 10 per cent solution in water is a common strength used.[1]

10. *Tetrasodium pyrophosphate* $(Na_4P_2O_7)$.—This phosphate is also useful as a deflocculating agent,[6 7 28] but exhibits a higher alkalinity (pH 11.2) that either hexameta or tetraphosphate.[1] It is more stable in hot muds, [3 14] the reversion to orthophosphate being slow. One source[3] reports that a 1 per cent solution boiled for 27 hours showed on appreciable orthophosphate content. If a mud is overtreated the accumulative effect may be adverse[14] if the alkalinity is not compensated. Because of a limited solubility in cold water it is generally used as a 5 per cent solution[1] with water (approximately 21 lb. to 50 gal. of water), although the concentration may be varied to suit. In some cases it is used in concentrations as low as 1 to 3 lb. in 50 gal. of water.[2] In speaking of the application of this phosphate to San Joaquin Valley deep drilling, one source[4] estimates the treatment to be in the order of 1 lb. per ft. of depth.

Special Drilling Fluids

The problem of drilling heaving shale or salt, the penetration of oil sands without the drilling fluid losing water into the sand, and the use of a fluid with a chemically reactible mud cake, have led to some interesting developments.

Not common to the Pacific Coast but much in evidence in certain sections of the Gulf Coast are deposits of shale which have earned the term "heaving shale" by their characteristic behavior. The chemical control[12] of these shales is based on the fact that certain types, when drilled through, are altered by water. Some swell, while others disintegrate. One definition of a heaving shale has been given[11] as, "Any shale, which sloughs, crumbles or otherwise falls into the hole in extensive quantities during normal drilling operations."

One of the most prominent methods for controlling heaving shale is by the use of a drilling fluid containing a substantial amount of sodium sili-

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Portion of mud-circulation system, showing part of covered mud pits with two of the four pumps in front

SAFETY — Wheels Removed From Christmas Tree

CHRISTMAS trees on flowing wells are not dangerous if properly installed and maintained but precautions must be taken in some areas to prevent tampering with the valves or the stealing of the valve wheels. There is a special danger where the wells are located in rather well-populated communities. Children may be playing about the well site and the fascination of turning a valve may lead to serious damage.

Under restricted rates of flow, the switcher or pumper on the lease generally cracks the tubing valve just enough to produce the day's allowable over an 8 to 24-hour period. He then checks the tank periodically to make sure there is plenty of room in the tank and no danger of its overflowing. If some child playing about the well should open the valve wide, the tank might fill in a few hours and run over the top and create a fire hazard.

The junk price of the valve wheels is not great but it is large enough to cause some petty thieves to collect them from christmas trees. This can lead to a very serious situation as the switcher may have only a few moments to close the well or some emergency may arise requiring that the well be shut-in quickly. If the valve wheels have been stolen since the last time the switcher was at the well, he will have to go to another well or the warehouse, find the proper wheel and return to the well. Tanks may have overflowed or separators may have been overloaded in the meantime.

Most operators standardize on one style of valve for their wells and keep the number of sizes used to a minimum. The switcher then needs to carry only one or two valve wheels with him to adjust the tubing and casing flow or to obtain a sample through the bleed-off connection. A still more convenient method is to have a handle made from flat steel with different size holes in it which will fit the various valve stems.

The tubing pressure gage has also been removed from the well to prevent its being damaged by children or stolen by petty thieves. The gages are more valuable and thus offer a greater temptation. If the switcher wishes to obtain the pressure on the tubing he can install a gage in a few minutes. This makes it possible to have a very accurate gage serving several wells instead of an inferior gage for each of the wells.

Opportunities for Qualified Men in Fields Abroad

(Continued from Page 69)

and a willingness to undergo any hardships incidental to their work.

So far as actual working conditions are concerned they do not differ materially from those which prevail in the fields and refineries in this country. The same equipment is used, field practices and refinery processing methods are similar and hours of employment are practically the same. In most Venezuelan camps, the working day for office employes starts at 7 a.m. and ends at 4 or 4:30 p.m. with 1½-hour noon and "siesta" during the heat of the mid-day. At one large camp work started at 6:30 and in the largest operation in Colombia the 7½-hour day starts at 6 a.m. Office employes at several camps do not work on Saturday.

In this connection the head of a petroleum engineering school said last year that he no longer recommended that their newly graduated students enter foreign employment. His explanation was that when they returned to this country after two or more years of foreign work they found that domestic companies appeared unwilling to credit them with this experience in giving them new work.

There does not appear to be any reason for this attitude on the part of domestic employers. The belief of some that foreign oil operations provide a tropical life of ease has no basis in fact. So far as the writer was able to observe persons employed in foreign operations, particularly the key men, work just as hard as they do in this country and have the same opportunities to learn the fundamentals of the work in which they are employed. In fact the men in charge of field and plant operations probably have greater responsibilities than in this country. They do not have the outside aids furnished by concerns serving the oil industry commonly found in this country. Emphasis is placed on ingenuity and the ability to get things accomplished regardless of difficulties.

It is true that men who spend considerable time in foreign fields do lose their contacts with employers and friends in this country and have that disadvantage to cope with should they return to this country seeking employment.

Personnel managers say that men entering foreign employment should look upon it as a career in much the same sense as do career men who spend their lives in the Government's diplomatic service. Temporary employment they feel, except for special assignments, does not work out to the best interests of everyone concerned. In contrast, employment over a period of years gives a person a background which qualifies him to give maximum service to his employer. It is also said that persons who look upon foreign work as permanent are more satisfied and more quickly make the necessary adjustments in manner of living.

Adaptability

"Adaptability" was stressed by one company executive with long experience in South America and other oil areas outside the United States, as a necessary attribute of a person who expects to be successful in foreign oil work. He drew a comparison with conditions in the army, quoting an American general who said, "Foreign service either makes or breaks an officer." The army head elaborated on this observation, explaining that service abroad was usually a test in self-discipline, determining whether an officer could adapt himself to living conditions which are different in many respects from those encountered in his home country.

A few men, in the language of the oil country, "go haywire." This usually is not due to working conditions, but is brought about by the manner in which a person spends his leisure time. He becomes a liability to his employer and to the country in which he is working and in a short time is back on home soil.

It reflects an inability on the part of the person to adjust himself to the limited facilities for recreation and amusement, coupled with the fact that many of the restraints of his home community do not apply in his new environment. Oil companies by spending large sums of money can establish satisfactory conditions for work, food, housing, and health, but obviously cannot duplicate all the facilities for the spending of leisure time found in this country. A person must take what is available and make the most of it or, as this executive explained, "he becomes a bore to himself and everyone around him."

The inevitable restrictions in regard to social contacts and amusements are the basis for most of the complaints of those working in foreign oil countries. This includes the wives and families, to whom these activities are probably more important than to the employed men. The circle of friends is usually limited to those living within the camp and engaged in the same line of work.

In some established camps, movies are furnished by the companies or are made available by employes' organizations, two or more times monthly. Radio reception of American and European programs in South America is largely confined to the short wave. Special interest is shown in

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Progress in METALS

By W. L. NELSON

Fatigue Tests of Welded Joints

MANY engineers have become accustomed to think of the tensile strength of carbon structural steel as 63,000 lb. per sq. in. and the fatigue stress as somewhat near 47,000 lb. per sq. in., and hence they were disturbed to hear of early European tests which showed a fatigue strength of structural members connected by welds of only 10,000-15,000 lb. per sq. in. in some instances. This and other information has led to a study of the fatigue strength of welded joints by Committee F of the Welding Research Institute. A progress report of this work was presented by Wilson and Wilder as "Fatigue Tests of Welded Joints in Structural Plates" before the American Welding Society in Chicago, October 1939. This study is summarized by the authors as follows:

"I. Tests of ⅞-in. plate carbon-steel specimens.

"1. For specimens in the as-welded condition, the values of the fatigue strength for a cycle in which the stress varied from tension to an equal compression were 21,600 lb. per sq. in. for failure at 100,000 cycles and 14,800 lb. per sq. in. for failure at 2,000,000 cycles; and for a cycle in which the stress varied from 0 to tension the values of the fatigue strength were 32,600 lb. per sq. in. for failure at 100,000 cycles and 23,100 lb. per sq. in. for failure at 2,000,000 cycles.

"2. For specimens in the as-welded condition except that the reinforcing had been machined off flush with the base plate on both sides, the values of the fatigue strength for a cycle in which the stress varied from tension to an equal compression were 29,400 lb. per sq. in. for failure at 100,000 cycles and 19,800 lb. per sq. in. for failure at 2,000,000 cycles; and for a cycle in which the stress varied from 0 to tension the values of the fatigue strength were 47,000 lb. per sq. in. for failure at 100,000 cycles and 30,100 lb. per sq. in for failure at 2,000,000 cycles. That is, removing the stress raiser due to the change in section at the edge of the reinforcing, increased the fatigue strength 43 per cent. Moreover, the fatigue strength of the welded specimens with the reinforcing planed off was equal to the fatigue strength of plates without welds.

"3. Stress relieving the specimens by heating them to 1,200° F. for 1 hour and then cooling them in the furnace had no effect upon their fatigue strength.

"4. For all kinds of specimens, stress-relieved or not stress-relieved, reinforcing off or reinforcing on, the fatigue strength corresponding to failure at 2,000,000 repetitions of a cycle in which the stress varied from tension to tension one-half as great, exceeded the yield point of the material, and is therefore not important to the structural designer.

"II. Tests of low-allow steel specimens.

"1. The strengths of the welded specimens of low-alloy steel plates were as follows:

"Static strength 83,000 lb. per sq. in.

"Fatigue strength based on failure at 100,000 cycles 24,400 lb. per sq. in.

"Fatigue strength based on failure at 2,000,000 cycles 16,100 lb. per sq. in.

"The values of the fatigue strength are for a cycle in which the stress varied from tension to an equal compression.

"III. Metallurgical studies.

"1. The metal in the heat-affected zone was somewhat harder than the original base plate and somewhat harder than the deposited metal but the differences were not great. This is true for both the carbon steel and for the low-allow specimens.

"2. The micrographs indicate a high degree of toughness in the heat-affected zone of the carbon-steel plates, a characteristic of steel having excellent weldability.

"3. The relatively small variations in hardness and the favorable grain structure indicate that there were no major metallurgical stress raisers present in the welds to affect the fatigue strength.

"4. Although the hardness variations in the low-alloy specimens were somewhat greater than in the carbon-steel specimens, the locations of the cracks indicated that the fatigue failures were due to geometrical rather than metallurgical properties."

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Flame Hardening in Oil Industry

FLAME hardening and treating has been discussed many times in recent months on this page,[1,2,3,4,5] but not until recently have specific applications for the oil industry been brought to our attention.

The process depends upon the fact that steel can be hardened if quenched from an elevated temperature. The surface of the material is heated by a gas torch and then cooled by means of a stream of water or compressed air and by several automatic methods.[5] Other processes have been used for hardening surfaces, such as carburizing, but flame hardening does not involve expensive equipment and flame-hardened objects exhibit a superior homogeniety of structure.

G. Van Alstyne, of the Air Reduction Sales Co., reports that cable sheaves, sprockets, ball races, tool joints, pump piston rods, plug valves, and swing joints are being hardened by the oil industry. In other industries, the following are some of the equipment being flame hardened: all types of gears, screws and worms; lathe ways and slides; crankshafts, camshafts, valve stems, rocker arms and axles in the automotive industry; rail ends, frogs, switches, cross-head guides and link blocks in the railroad industry, and rolls and crane wheels in steel mills.

Shown here is a carbon-steel lathe spindle, 63 in. in diameter, which is being flame hardened with oxy-acetylene equipment. It is one of the largest production operations performed and successfully completed since the development of surface hardening by the oxy-acetylene process (Courtesy Westinghouse)

Catheads were among the first equipment that were flame hardened in the oil industry. The Kinzback Tool Co., of Houston, Tex., reports that flame-hardened catheads last about five times as long as the regular equipment. A cathead is normally worn out in drilling a 5,000 ft. hole. By using an excess of acetylene gas during the heating, it is thought that a thin case or skin of carburized material can be formed on the surface of the material as well as the regular flame-hardened surface.

Cast-steel sprockets are being flame hardened by the Beaumont Iron Works of Beaumont, Tex.[6] The sprockets are usually manufactured from a steel somewhat similar to S.A.E. 4330 but containing only 1.24 per cent of nickel, 0.44 per cent chromium and 0.33 per cent molybdenum and heat treated by annealing, normalizing and drawing. However, when the drive sprockets on the draw works have a particularly hard service to meet, they are flame hardened to a Brinell number of 400-500.

The pinions of the rotary machines of the Emsco Derrick & Equipment Co., Los Angeles, are being flame hardened to a Brinell number of 480-555. In many instances common oil-field equipment must be hardened to almost a brittle condition in order to provide wear resistance whereas by flame hardening it is possible to attain a wear-resistant surface without destroying the toughness of the main body of material. Nickel-molybdenum steel (S.A.E. 4640) is used for the rotary pinions.

Alloy steels are used extensively for flame hardening, but the alloy elements contribute little to the surface hardness. The advantage of alloy elements lies in their ability to strengthen and toughen the main body of material. Most ferrous materials, cast iron, malleable iron, and medium carbon steel, can be hardened by the use of the flame-hardening processes.

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Molybdenum in Petroleum Industry Steels

THE October issue of Metals and Alloys contains some 30 or more reviews of the improvements in metals and alloys during the last 10 years. Among all of these, only one direct reference is made to the petroleum industry, i.e., the use of molybdenum steels. The growth in the use of molybdenum steels is evident in the following figures:

	1929	1938
World consumption of molybdenum steels	3,000,000 lb.	28,000,000 lb.
Total steel production	118,300,000 tons	105,850,000 tons

In the Oil Industry

"The use of molybdenum steels for oil-drilling equipment has increased from practically nothing in 1929 to an almost universal use today. A combination demand for stronger materials and better drilling economy in deep drilling has led to the use of molybdenum steels of various types in practically every kind of drilling and pumping equipment.

"The same extension in use has taken place in oil refining. In 1929 little was known about creep strength of steel at elevated temperatures, and there was less necessity for the knowledge. Continual increase in operating temperatures and pressures made good creep properties essential and led to the development of several molybdenum steels particularly adapted to refinery work. Today these steels are standard. Much the same situation has resulted in the standardization of carbon-molybdenum steel for steam generating equipment."

Oversize Joints Reduce Drilling Costs in Illinois Basin

Left: Box end of 3½-in. drill pipe with ¼-in. oversize tool joints after making 11 wells. Right: Pin end of 3½-in. drill pipe

By HARRY F. SIMONS

ONE of the principal items which has added to the drilling costs in the Illinois basin development has been the excessive wear on tool joints and drill pipe, the average drill stem making only about one-half the footage it would make in other areas. Some strings of drill pipe have made as little as 30,000 ft. of hole before they were junked, while others have made as much as 90,000 ft. of hole before they were considered unsafe; the latter cases have not been numerous and generally from 50,000 to 60,000 ft., with two replacements of the tool joints, has been considered very good service.

There is also a wide difference in the wear on drill pipe in different areas, some fields being more easily drilled and hence requiring less time and fewer rotations of the drill pipe in the hole. In the central basin area, the wells are generally deeper than on the western side, the hard Pennsylvanian sands cut down the life of the drill pipe; several of the Chester formations are very abrasive and consequently the drill pipe receives much more wear per well. In the wells drilled below the McClosky lime in any area, the tool joints and pipe have shown signs of wearing in a very short time.

The wear on the tool joints and pipe has put a premium on keeping the drill stem straight and on drill-stem management, i.e., changing the position of the various joints in the string so all of them receive approximately the same amount of wear. The effort to reduce the costs of this item has also led to hard-surfacing applications of various sorts although none of them have been completely successful principally because of the costs involved. However, apparently the most successful method of increasing tool-joint life to date has been the introduction of oversize tool joints on drill pipe used by the Pure Oil Co. on its rigs.

Oversize tool joints are standard in every way except that the outside diameter is increased, thus providing a thicker section of metal which must be worn away before the tool joints become dangerously thin. The increase in size has not caused a quicker wearing away of a unit thickness of the outer surface of the joint as might be expected as the larger circumference naturally reduces the clearance in the hole.

About a year ago, Pure Oil Co. reduced the size of the drill pipe used on its rigs from 4½-in. to 3½-in. o.d. and at the same time reduced the side of the hole drilled from 8¼-in. to 7¼-in. The standard tool joint for 3½-in. drill pipe measures 4⅝ in. in diameter.

Pure Oil Co. engineers keep a record of each string of drill pipe, measuring it after each well, checking the total footage and examining the pipe to make sure that the danger of fishing jobs will not be too great. Whenever the tool joints become worn to the danger point, they are replaced. Generally this is after the standard joints have made eight or nine wells but partial replacement of joints sometimes has to be made before this.

To reduce the number of replacements with the accompanying expense and down time, Pure engineers tried the oversize joints. The outside diameter of the oversize joints is 4⅞-in., ¼ in. thicker than the regular joint. No change in derrick equipment was necessary as the tongs fit on the oversize joints as well as the regular joint. There was also no indication that the increase in the outer circumference of the tool joints affected the pump pressure or that the larger joint affected the flow of drilling fluid from the hole.

The oversize joints have shown a 33 per cent increase in the amount of hole that could be drilled before replacement became necessary. So far, three strings of drill pipe have been equipped with the larger joints and each set has made 11 or 12 wells, or three wells more than the regular joints have been making; this amounts to approximately 9,000 ft. of hole. Premium for the oversize joints is 5 per cent per ¼ in. added to the outside diameter.

A tool-joint examination at the conclusion of drilling approximately 11,500 ft. of hole with one string of pipe equipped with oversize joints showed that the average diameter of both the pins and boxes was 4-44/64-in., or ⅛ in. larger than the regular joint when new.

When the second set of oversize joints is worn and ready for replacement, a problem presents itself as the pipe has not sufficient life in it to warrant the installation of new joints and yet it still is capable of considerable more service. At 58,000 ft., the installation of new joints would call for a total footage of about 90,000 ft. and there have been very few strings of pipe to make that amount of hole in Illinois. An economical method of applying hard-surfacing material would help solve this problem and efforts are being made in this direction by a number of firms. Applications of hard-surfacing material to date have added five or six wells to the life of the drill pipe.

Tool joints of greater oversize could be used except for the difficulty of fishing in case there was a breakoff in the pipe thread on the pin end. The standard overshot used in a 7¼-in. hole has a body diameter of 6 13/16-in. and the maximum opening of the slip is 5 in., thus allowing only 1/16-in. clearance to get over the fish when using tool joints having a diameter of 4⅞ in.

Above: Extra tubular material needed to complete well in Illinois basin by rotary method. Drill pipe is 2½ in. with bottle-neck tool joints having two-step threads

Below: Pipe of 4½-in. diameter for making surface hole and 3½-in. drill pipe for making regular hole

Chemicals in Drilling and Producing Operations

(Continued from Page 191)

cate.[12] [13] An explanation of the action of silicate mud is based on work indicating[13] that heaving shales tend to keep the water in contact with them (from drilling fluid) at a pH of 7 to 9. Silicate drilling fluids have a pH of approximately 11. The buffering capacity of the shale tends to reduce the pH of the mud, precipitating silica gel to form a protective coating over the shale. The presence of common salt in the silicate fluid adds to its effectiveness.[12]

The type of sodium silicate found most useful in shale control is one containing 14.5 per cent Na_2O and 29 per cent SiO_2.[12] While the composition of silicate drilling fluids can vary, one source[12] mentions a silicated mud made up of 37.1 per cent clay, 28 per cent water, 22.2 per cent sodium silicate of the $Na_2O : SiO_2$ ratio mentioned above, 5.1 per cent salt, 7.5 per cent weighting material, and 0.1 per cent bentonite.

Another type of treatment[13] for heaving shale is based on the fact that shales contain the chlorides, sulfates, and nitrates of sodium, calcium, and magnesium, minute crystals of which are found through shale bodies. As the shale becomes wet with water from the drilling fluid these salts go into solution and a phenomenon known as osmosis is thought to occur with the rapid movement of water from the mud to pockets of solution within the sale. To overcome the penetration of mud-water into the shale the dissolved solids content of the water phase of the mud is increased by the addition of calcium chloride, magnesium chloride and/or the sulfates and nitrates of calcium magnesium, thus checking the osmotic effect by eliminating the drawing force required to draw water into the shale.[15]

Drilling through salt. — In the drilling of salt domes on the Gulf Coast the flocculating effect of the salt on mud has been controlled by the use of a special mud-making material made up from a selected Texas clay treated with alkali and the colloid content adjusted with bentonite.[27] Another fluid is made up from a selected Florida fuller's earth.[28] The application of sodium hexametaphosphate to ordinary muds has also proved helpful in controlling the effects of salt contamination.

Oil-base drilling fluids.—The desire to prevent penetration of water from the drilling fluid into low-pressure sands with the attendant danger of fluid-lock has stimulated the application of oil-base drilling fluids. Some of these fluids are water-in-oil emulsions, while others appear to be made up of selected oil-wettable solids suspended in a heavy oil base.

One source[21] describes an oil-base fluid prepared from crude oil weighted with oil-wet clay which was used in coring oil and gas zones in the Ana huac and Tomball fields in Texas. The weighting material was spent refinery clay. The fluid was treated with 0.5 per cent oleic acid and 1 per cent of concentrated (98 per cent) sulfuric acid. Litharge was added to increase the density.

Another fluid has been described[49] which can have either crude oil, low-viscosity tars or gas oil as a base. The material is then mixed with a powdered weighting material which is preferentially wetted by the oil. Among such materials are spent refinery clay, ground limestone soaked with tar and carbonized, or powdered silica which has been treated in a like manner. Such a mixture can contain 40 volume per cent of spent clay, 15 volume per cent of limestone, and 45 volume per cent of oil base.

Another oil-base fluid[50] is made up of 55 volume per cent of water, 45 volume per cent of oil, and 1 volume per cent of concentrated sulfuric acid and jet-mixed to emulsify. Asphalt can be incorporated into the mixture by using 60 per cent of 34° to 40° gravity oil, 40 per cent water, and 1 to 2 per cent of asphalt based on the total weight of the emulsion.

Carbonate mud.—Another trend in the drilling of low-pressure sands, and in some cases even high-pressure sands, has been the addition of powdered limestone to ordinary clay drilling fluids to impart an alkalinity reactible with inhibited hydrochloric acid. The mud cake made by such a mixture can be easily removed with acid and the face of the sand cleaned more thoroughly. Carbonate mud is also useful throughout the course of drilling in that in the event of stuck tools acid can be applied.[2]

The amount of powdered limestone used varies. One recommendation is based on 20 to 30 lb. to each barrel of mud;[25] while another[6] mentions the addition of an amount equal to 15 per cent by weight. The powdered limestone usually runs about 100 per cent through 100-mesh and 85 per cent through 200-mesh. The addition of powdered limestone to a mud will: (1) raise the weight; (2) affect pH little; and (3) in some cases raise the viscosity.[25] The rise in viscosity can usually be controlled chemically.

Lost Circulation

The maintenance of circulation during drilling is of vital importance and the loss of mud into porous sands, fractured shale bodies, etc., has led to the development of many procedures applicable as agents to plaster or seal off the sections where circulation is being lost.

Fibrous materials.—Among the simplest procedures are those which incorporate different coarse or fibrous materials into the mud which may bridge the crevise and allow mud cake to build up. Cottonseed hulls; dry beet pulp in the mud or in gel cement;[26] fish scales; flaxseed; mica flakes; wheatbran; rubber pulp and asbestos[29]—

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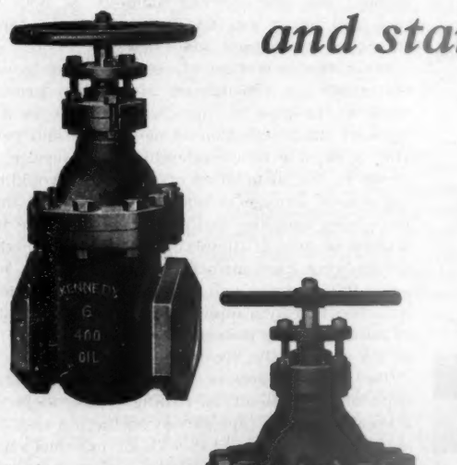

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all have been used with varying degrees of success. Eight to ten-mesh pine sawdust to the extent of 5 to 10 lb. per bbl. of mud[19] is often helpful. A fibrous material which has received considerable application is a selected bleached sugar cane fiber[67] treated to resist wetting. Twelve to fourteen pounds are added to each barrel of mud. Portions of mud can be heavily laden with the material and spotted as a slug, or the screens bypassed and the entire stream treated with lesser amounts.

Silicates

The very adhesive gelatinous precipitates obtained by treating sodium silicate (11 per cent Na_2O and 31.2 per cent SiO_2) with calcium chloride, lime, aluminum sulfate and magnesium silicofluoride[19] have also been of assistance in regaining circulation. In one instance[19] 170 gal. of 41° B. sodium silicate (8.9 per cent Na_2O and 29 per cent SiO_2) were added to 100 cu. ft. of 71-lb. mud. Ten gallons of water was then added which contained 2.2 lb. of flake calcium chloride.

Gel cement.—The application of a cement slurry containing hydrated bentonite[27, 28] has frequently been of material assistance. Depending upon the water : cement ratio the amount of bentonite used varies from 1 to 5 lb. per sack of cement. For example, if the water : cement ratio should be 8.5 gal. per sack (70 per cent slurry) 2½ lb. of bentonite per sack would be used if the bentonite is first hydrated. If the bentonite is first mixed dry with the dry cement 5 lb. per sack would be used. . . .

Alginate precipitates.—When a collodial solution of sodium alginate (derived from seaweed) is treated with calcium chloride, stringy, fibrous calcium alginate is formed.[68] This precipitate has been useful in regaining circulation. Usually a 40° B. calcium chloride solution is added to a solution of 8 lb. of sodium alginate dissolved in 50 gal. of water.[68] . . .

Cements for Oil Wells

While cement *per se* is not thought of as a chemical, yet it is composed of chemical compounds the behavior of which are of importance in oil-well cementing procedures. Since the days when rule-of-thumb methods characterized the cement job, much has been learned about the properties desired in cements for field work. The oil industry is now aware of certain fundamentals among which can be mentioned that the more water added to a cement in forming a slurry the less the strength of the final set. Any water in excess of that needed for hydration is likely to leave voids and capillary water[25] physically held which will weaken the mass.

It is now known in the oil field that temperature accelerates setting; and further, that the fineness of the cement (surface area or particle size) also affects the speed of setting. Water can react with a cement only by entering through the surface of the cement particles,[25] hence a decrease in particle size (increase in surface) renders a cement more reactive to both temperature and water—and the greater the surface the greater the amount of water needed for slurrification. From this it becomes evident that one of the ways to increase the resistance of a cement to temperature[25] is to grind it coarser.

In the manufacture of cement[25] the correct combination of limestone with clay or shale or slag is burned at about 2,800° F. and the resulting clinker ground to form the cement. During the burning, lime (calcium) combines in different ways with silica, alumina, and iron to form clinker compounds. The four main clinker compounds affecting cement properties are known as:

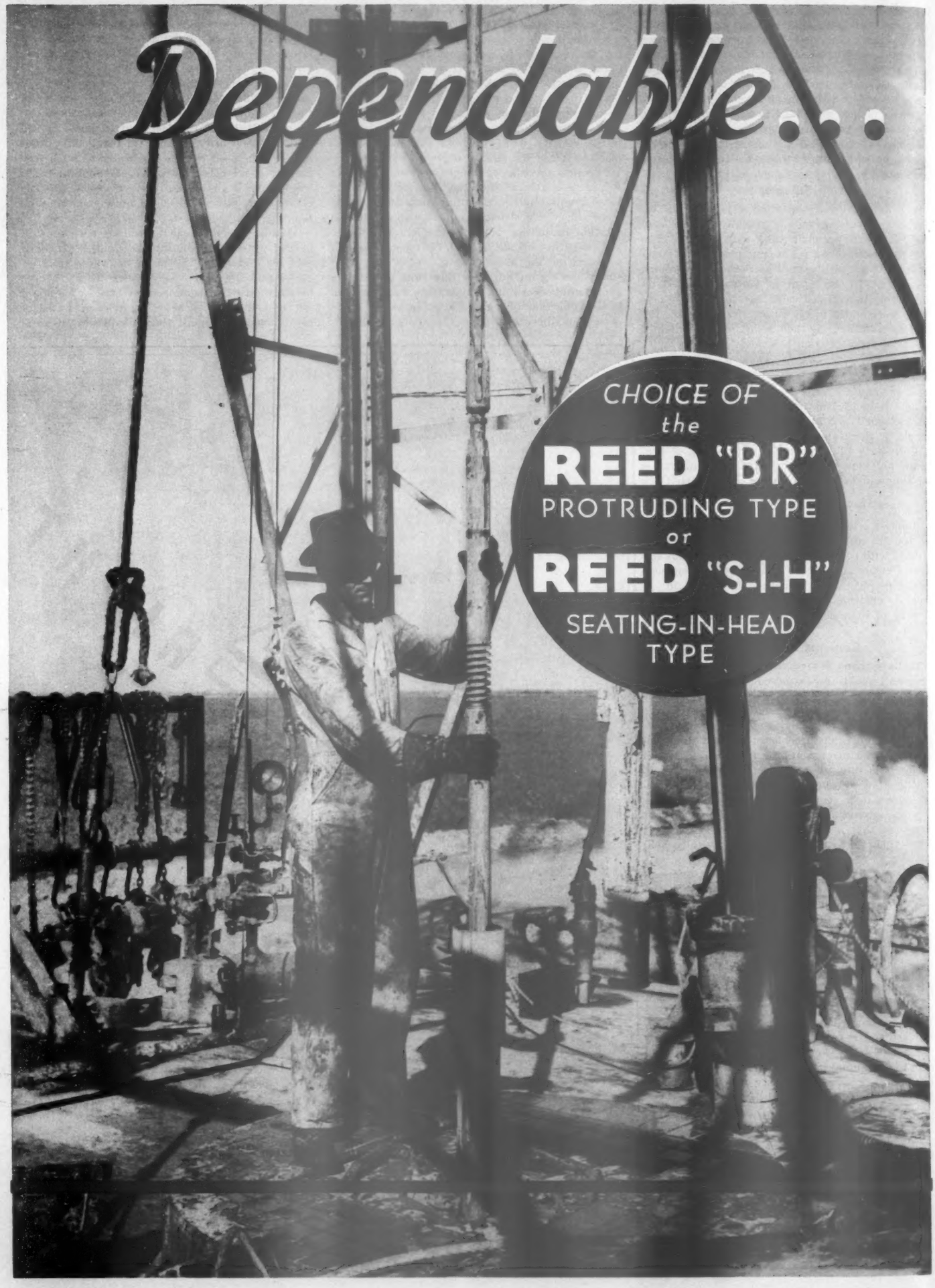
C_2S	dicalcium silicate
C_3S	tricalcium silicate
C_3A	tricalcium aluminate
C_4AF	tetracalcium alumino-ferrite

When water is added to cement the tricalcium aluminate (C_3A) contributes chiefly to the rise in temperature of the slurry and its initial stiffening.[25] The fluidity of a slurry at constant water : cement ratio is affected principally by the dicalcium silicate (C_2S) and next by the tetracalcium alumino-ferrite (C_4AF).[25] In addition to the role played by coarseness of grain the principal constituent contributing resistance to the effect of high temperatures is the tetracalcium alumino-ferrite (C_4AF), with dicalcium silicate (C_2S) second and tricalcium silicate (C_3S) third.[25]

Chemical increase of cement thickening time.—It has been found[62] that the addition of sodium tannate will lengthen the thickening time of a cement slurry exposed to increased temperature. A solution containing 5 per cent quebracho and 5 per cent caustic soda is used. By incorporating 1 per cent of the above mixture of 35 per cent slurry having an initial setting time of 4 hours and 20 minutes at room temperature was increased to a setting time of 8 hours at room temperature. A similar slurry setting in 1½ hours at 150° F. was retarded to a 2½-hour set at 150° F. by the use of 1 per cent of the above mixture. Several brands of oil-well cements contain chemical retarders.

Gypsum cement (calcium sulfate, or plaster of paris).—This material is finding use because of the accuracy with which its thickening time can be controlled, and the fact that it gains its full strength soon after setting. On the Pacific Coast it has been used to shut off water,[69] and in the East it has received considerable application in the killing of gas wells, the recovery of lost circulation in cavernous limestone, and in shot-tamping.

Gypsum cement is calcium sulfate with one-half part of water of crystallization ($CaSO_4 . \frac{1}{2}H_2O$). It sets by taking on 1½ parts of water ($CaSO_4 . \frac{1}{2}H_2O$ plus 1½ H_2O equals $CaSO_4 . 2H_2O$). In the preparation of gypsum cement care is exercised not to dehydrate to below ½ part of water of crystallization or nonsetting anhydrite ($CaSO_4$) is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formed. When colloidal material is added to a gypsum : water slurry the setting time is retarded, but when certain crystalline materials are added the setting time is accelerated. By such chemical treatment this material can be made to resist temperature or to set under violent agitation.

Acidization

Little did Dr. Herman Frasch realize back in 1896 when he treated some Michigan water wells with acid that he had fostered a procedure which would, 33 years later, play an important role in the oil industry. The limitation to the early applications of acid was of course due to the fact that the injection of such an active material as muratic acid (hydrochloric acid) entailed the inevitable damage or destruction of all steel with which it came into contact. Since then it has been found in connection with the pickleing of metals that the addition of small amounts of certain substances to the acid solution render the metallic surface temporarily passive to the action of acid, with a nominal loss of metal. This action has come to be spoken of as "inhibition." Inhibition is also carried out in the application of acid to oil wells.

Nature of Inhibition

There are several theories as to how inhibitors work, but one in particular[81] which is thought to be the best is based on the electrical attraction of the inhibiting chemical substance to the metal in contact with the acid (drill pipe, casing, etc.) due to the presence of unlike charges on the materials.

When iron from the drill pipe or casing goes into solution in an acid, particles of iron leave the surface of the metal and go into solution as positively charged ions. This leaves two negative charges at the surface of the metal. Chlorine ions from the hydrochloric acid combine with the iron ions to form chloride of iron. Two positively charged hydrogen ions from the acid then go over to the metal surface which is negatively charged and are neutralized to form a molecule of hydrogen gas which, in quantity, soon becomes evident as bubbles rising to the surface.

The objective of inhibition then becomes that of preventing the hydrogen ions from reaching the metallic surface. This is accomplished by means of certain organic chemicals the molecules of which, though neutral as a whole, are more negative at one end than at the other—the other end being more positive. These substances have come to be known as "polar molecules" because they seem to have a positive and negative pole.[81] When present in an hydrochloric acid solution in contact with steel the positive ends of these molecules are attracted to the negatively charged surface of the steel due to iron going into solution, and the positive ends balance the negative charge on the surface of the metal. In balancing the charge at the metal surface the polar compound actually deposits a layer, or coating, one molecule deep which acts as a barrier preventing the hydrogen ions from the acid from becoming hydrogen gas.

Inhibitors.—Many substances act as inhibitors but the degree of inhibition varies widely. Most are complex organic compounds, among which can be mentioned petroleum and coal tar acid sludges;[83] methyl-phenyl-thiourea;[83] quinazoline derivatives;[84] different polyamines;[85] different arsenic combinations;[84] mercaptans;[85] and thiophenols.[86] The strengths used vary considerably. From ¼ to 1 per cent based on the weight of the concentrated acid has been used.[84]

Hydrochloric (muriatic) acid.—In the oil industry hydrochloric (muriatic) acid is to the driller and producer what sulfuric acid is to the refiner. By far the greatest amount of hydrochloric acid is used in treating limestone sections, but certain basic advantages in the use of this material make it of importance whether the alkalinity with which it reacts is limestone, or water scale (largely lime compounds),[88] or carbonate mud.[5]

One of the chief reasons why[88] hydrochloric acid is used more extensively is that when it reacts with calcareous substances, the product of the reaction is largely soluble calcium chloride and carbon dioxide gas, thereby minimizing the formation of insoluble sludge. Hydrofluoric acid is usable, but is costly and dangerous. Nitric acid, while forming soluble nitrates, costs about three times as much as hydrochloric acid. Sulfuric acid is not practical because it reacts with calcium compounds to form insoluble calcium sulfate.

Addition agents—As the use of hydrochloric acid has expanded in the oil field much work has been done to incorporate within the water solution of the acid (usually about 15 weight per cent HCl) other agents which will assist the acid in performing special functions—or in other words, agents which will permit the control of the acid. These added materials have been spoken of as addition agents.[81]

Probably the most important addition agent has already been discussed under the heading of inhibition. Others imparting valuable properties are those which: (1) speed up the action of acid on dolomitic limestone; (2) retard the action of acid on fast limestone; (3) reduce the surface tension of the acid and permit the effective withdrawal of reaction products; and (4) agents permitting the acid to "wet through" or penetrate oil-soaked limestone or mud cake.

Intensified acid.—It has been shown[89 88] that the action of hydrochloric acid on calcium sulfate and magnesium compounds can be intensified by 5 to 10 per cent of ammonium bifluoride in an aqueous solution of the inhibited acid. In attacking sulfate ("gyp") scale[87] the use of 55 to 65 per cent hydrochloric acid with 45 to 35 per cent acetone is said to be effective.

Retarded acid.—When acting on fast limestones the speed of the reaction can be retarded[90] by incorporating either 0.1 to 5 per cent of furfural; or 0.1 to 5 per cent of furoic acid; or 0.05 to 5 per

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cent furfuryl alcohol in the inhibited aqueous acid.

Surface tension reduction.—In some instances in the acidizing of low-pressure wells it has been observed that the spent acid is withdrawn with difficulty[48] and may contribute to the retention of oil within the sand by water-block. To offset the possibility of such an effect, materials are frequently added to inhibited hydrochloric acid which reduce the surface tension. Addition agents which lower surface tension enable the acid to penetrate faster.[51] To accomplish this effect one procedure[48] is to add various water-soluble alcohols to the acid. Methyl alcohol, ethyl alcohol, normal and isopropyl alcohols, and butyl alcohol are among those said[48] to be useful in the reduction of the surface tension of acid.

Demulsifying acid.—It has been pointed out[52] that acidizing brings together aqueous acid, formation water (brine), the brine resulting from the spending of the acid, oil, carbon dioxide gas, and silt—all of which are ingredients for the formation of stable emulsions. To offset this possibility in certain cases demulsifying agents are incorporated in the aqueous acid.

Miscellaneous acid modifications.—When hydrochloric acid acts on limestone, a gelatinous precipitate of ferric hydrate may be deposited as the acid is neutralized in acting on acid-soluble iron compounds. If the pH of the spent acid can be maintained the iron hydroxide will not precipitate. This may be accomplished[48] by adding sulfur dioxide to the hydrochloric acid and maintain the desired pH with sulfurous acid; or by the addition of lactic acid.[50]

If it is desired that the hydrochloric acid exhibit foaming properties this may be accomplished by incorporating 0.05 to 2 per cent of gelatin, saponin, or licorice extract.[51]

If it is desired that the acid be given a horizontal plane of action at a given point, this may be done by spotting a heavy brine solution made up of the chlorides of sodium, calcium, or magnesium or the sulfates of sodium and magnesium ahead of the acid.[48]

Thirty per cent aqueous acetic acid has been found useful in dissolving cement;[48] and if a direct attack on a siliceous formation is desired, hydrofluoric acid can be generated opposite the formation by reacting hydrochloric acid with sodium fluoride.[47]

Selective exclusion of water.—Much has been accomplished through the use of portland type cements in bringing about the selective exclusion of water sands, but the problem has also received its share of attention chemically. The chief trend has appeared to lie in ways and means of introducing water-insoluble substances in a vehicle which would carry the material in partial or complete solution until the contact with the water sand is made. After contact with water the diluting effect or outright reaction causes the precipitation of the water-insoluble material in the pores of the sand, thereby restricting or shutting off the flow.

Antimony trichloride, silicon tetrachloride, and superfatted soaps have been mentioned[48] as among the chemicals forming voluminous precipitates when mixed with water, and which can contribute to the selective exclusion of water. Another idea[48] has been to force a silicate of soda (11 per cent Na_2O and 31.2 per cent SiO_2) into the sand and then follow with a strong solution of calcium chloride to form a silicate sludge. Another procedure[53] is built around the pumping of a 20 per cent solution of magnesium chloride into the sand and following it with the injection of a 50 per cent solution of caustic soda to form gelatinous magnesium hydroxide.

An interesting attack[52] on the problem is the use of a 10 to 50 per cent metal alcoholate dissolved in mineral oil, gasoline, alcohols or carbon tetrachloride which hydrolizes in contact with water to form an insoluble metal hydroxide. Another method[55] is to dissolve sulfur in aniline and inject the mixture into the water sand, bringing about the deposition of sulfur. Stearin dissolved in isoamyl alcohol accomplishes[48] a similar objective. The use of a strong solution of a water-soluble soap[54] such as sodium palmitate or stearate followed by sodium aluminate as a precipitating agent has been given as a sand-plugging agent; and sodium silicate with soap[56] reportedly will cause a similar effect.

Various proportions of ammonium bicarbonate and sodium silicate[47 56] when mixed in water result in a cementitious mixture with a controllable setting time which can be injected into a water sand.

Selective wetting.—It has been shown that clay and hydrated silica have a greater affinity for water than for oil;[58] ordinary oil sand is more easily wet by water than oil;[58] and that with an equal head water will displace oil in its flow through a sand to a well bore.[58]

This has led to a development[58] which consists in chemically treating a well making water so as to reduce the proportion of water produced without substantially interfering with the flow of oil. It is carried out by depositing a chemical precipitate on the water-wet sand so that it is rendered less permeable to water. Certain precipitates are preferential wetting agents among which is calcium sulfonate.

Reduced surface tension washes.—Under acidization it was mentioned that the addition of chemicals which would reduce the surface tension of the acid were of importance in that they contributed to a more effective drainage of spent acid back into the well bore. The advantage of this property may be of wider significance in acidizing limestone but the trend is also toward utilizing surface-active agents in acidization pro-

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cedures other than in limestone, and also the incorporation of such agents in wash water alone.[84]

One of the reasons[85] advanced for the use of surface-active materials is that in the completion of low-pressure wells, the reduction of the surface tension of the wash water to a value approaching that of oil will assist in overcoming the resistance to the flow of oil normally offered by water. Another reason[85] is that the loss of mud-water into the formation may contribute to the formation of a water-block which a reduced surface tension water wash might help in breaking down. . . .

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QUESTIONS ON TECHNOLOGY

By Charles K. Francis, Ph. D., Technical Editor

Term Neutral Lubricating Oil Has No Exact Meaning

It has been our understanding that a neutral oil was of light viscosity, usually from 55 to 350 at 100° F.; refined without acid treatment. We note some refiners make quotations on neutrals with viscosity running 1,200 to 2,000 at 100° F. Because of this misunderstanding we would appreciate it if you would be kind enough to advise us what constitutes a "neutral oil?"—W. T. L.

The term neutral oil does not have the significance in the industry today that it had 50 years ago. Changes in refining operations and the introduction of new methods for the manufacture of lubricating oils have made the term obsolete.

The first use of the word neutral appears to have been made in the early days when the crude oil was of the paraffin-base type. The neutral oil was derived from the lubricating oil or wax distillate fraction of the crude oil. This was passed through a wax press and the pressed distillate contained the neutral fraction.

The practice was to redistill the pressed distillate from which several cuts were made and the portion remaining in the still was the viscous stock. The overhead portions were of low viscosity and therefore designated nonviscous. The nonviscous fractions were seldom treated with acid, simply being filtered through fuller's earth. The filters were of the percolating type, so the first portion of oil to pass through was water-white in color; the longer the filter was in operation the darker became the oil but the general practice was to finish the batch with a dark reddish green color. Because these oils received no chemical treatment it was proper that the word neutral should be used. The trade gradually accepted the term neutral oil to mean an overhead stock, a distillate, which was of rather low viscosity as compared with the heavy high viscosity oil or bright stock, which had been obtained as a residue, from which lighter oils had been removed by distillation.

Originally the nonviscous neutrals were lubricating oils of relatively low viscosity; probably ranging from about 50 to 300 seconds, at 100° F., Saybolt Universal viscosity. It is now the practice to take off under vacuum fractions of high viscosity, even of the bright stock class, which do not receive chemical treatment, so oils of this type could be designated neutrals, according to the original meaning of the term.

Physical and Chemical Laws and Principles Used in the Petroleum Industry

OXIDATION AND REDUCTION

Oxidation in its simplest form means increasing the quantity of oxygen, but it also means raising the proportion of an acid-forming element or radical in a compound. Reduction refers to a process which increases the proportion of hydrogen or base-forming elements or a radical in a compound.

Function of Chemicals Used in Making Circulating Muds

I understand that certain chemicals are recommended to be added to drilling mud. These are commonly caustic soda, sodium phosphate, sodium carbonate and sodium silicate. Will you inform me what is the purpose of such chemicals?—G. H. E.

Chemicals are used in drilling muds for the purpose of maintaining alkalinity, stabilizing the circulating fluid, to modify viscosity and to strengthen formations, such as shales that tend to slough.

Caustic soda is a strong alkali which may serve to modify a hard water and to keep the mixture alkaline. The common practice is to add small quantities of a weak solution, about 5 per cent in water, to the mud mixture.

The several sodium phosphates are used in solution when a weak alkaline condition is desired. The phosphates are not very soluble in cold water so no effort should be made to use them beyond a 5 per cent solution.

Sodium silicate is a strong alkali, used for alkalinity control and as a thinner. It is also valued as a stabilizer for certain formations, such as the heaving shales. It combines with lime and the phosphates.

Technical Specifications for Commercial Fuel Oils

Will you kindly inform me as to what are the technical specifications for fuel oil Nos. 1, 2, 3, 5 and 6? These are apparently new standards of the oil industry which are needed so that we may adjust our contracts to the new basis.—J. M. C.

The latest tentative specifications for fuel oil have been announced by the American Society for Testing Materials as follows:

DETAILED REQUIREMENTS FOR FUEL OILS*

Grade of fuel oil†	Flash point, °F. min.	Flash point, °F. max.	Pour point, °F. max.	Water and sediment, per cent max.	Carbon residue, per cent max.	Distillation temp., °F. 10% point, max.	Distillation temp., °F. 90% point, max.	Distillation temp., °F. End point max.	Distillation temp., °F. End point min.	Viscosity, sec Saybold Univ. at 100° F. max.	Viscosity, sec Saybold Univ. at 100° F. min.	Viscosity, sec Saybold Furol at 122° F. max.	Viscosity, sec Saybold Furol at 122° F. min.
A distillate oil for use in burners requiring a volatile fuel	100 or legal	165	0	trace	§0.05 on 10% residum	410	....	¶560	....	....	....	....	....
A distillate oil for use in burners requiring a moderately voltatile fuel	110 or legal	190	‡10	0.05	§0.25 on 10% residum	440	660	....	....	....	....	....	....
A distillate oil for use in burners requiring a low viscosity oil	110 or legal	230	‡20	0.10	0.15	....	675	....	**600	45	....	....	....
An oil for use in burners requiring a medium viscosity fuel (Ash, max. % = 0.10)	130 or legal	....	1.00	....	....	....	....	....	....	....	50	40	....
An oil for use in burners equipped with preheaters permitting a high viscosity fuel	150	....	††2.00	....	....	....	....	....	....	....	....	300	45

*Recognizing the necessity for low-sulfur fuel oils used in connection with heat-treatment nonferrous metal, glass and cermatic furnaces and other special uses, a sulfur requirement may be specified in accordance with the following table:

Grade of fuel oil	Sulfur, max. per cent
No. 1	0.5
No. 2	0.5
No. 3	0.75
No. 5	no limit
No. 6	no limit

Other sulfur limits may be specified only by mutual agreement between the purchaser and the seller.

†It is the intent of these classifications that failure to meet any requirement of a given grade does not automatically place an oil in the next lower grade unless in fact it meets all requirements of the lower grade.

‡Lower or higher pour points may be specified whenever required by conditions of storage or use. However, these specifications shall not require a pour point lower than 0° F. under any conditions.

§The carbon residue on 10 per cent residum may be increased to a maximum of 0.12 per cent when this oil is to be used in other than sleeve-type blue-flame burners. This limit may be specified by mutual agreement between the purchaser and the seller.

¶The maximum end point may be increased to 590° F. when this oil is to be used in other than sleeve-type blue-flame burners.

‖To meet certain burner requirements, the carbon-residue limit on this oil may be reduced to 0.15 per cent on 10 per cent residuum.

**This requirement may be waived if the A.P.I. gravity is 26 or lower.

††The amount of water by distillation plus the sediment by extraction shall not exceed 0.50 per cent. The amount of sediment by extraction shall not exceed 0.50 per cent. A reduction in quantity shall be made for all water and sediment in excess of 1.0 per cent.

Centipoise Viscosity of Kerosene Changes With Temperature

Referring to McAdams text, Heat Transmission, Page 192, the value of 3.82 centipoises at 140° F. is given for kerosene. The table on Page 200 gives a viscosity of 3.82 for kerosene at 68° F. Assuming that the values for viscosities in Table 14 are in centipoises, there appears to be an error. Can you clear me up on this?—T. R. F.

The author, Dr. W. H. McAdams, has supplied the following:

Referring to viscosity data in Heat Transmission, we find that the data on Page 200 is correct in pounds per hour-foot units. These data were taken from Sherwood and Petrie, Ind. Eng. Chem., 24, 740 (1932).

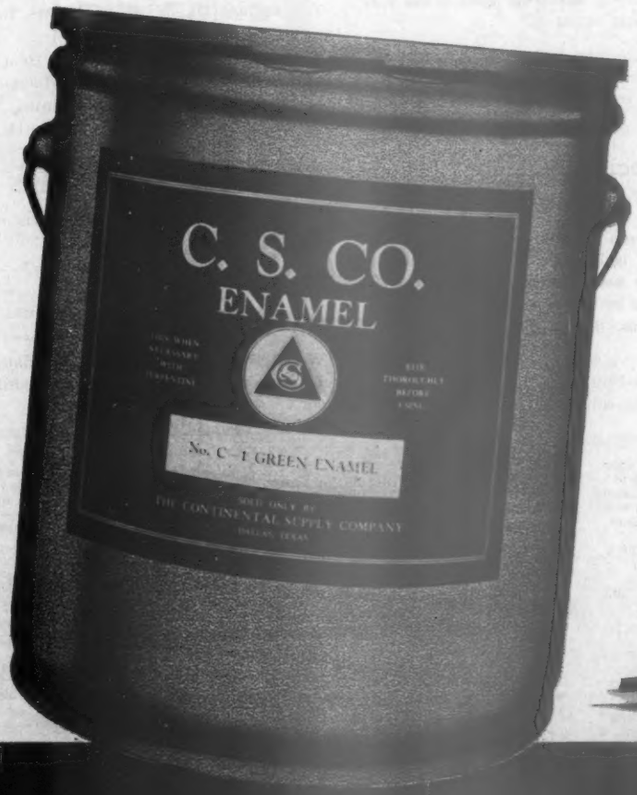
VISCOSITY OF KEROSENE

Temperature °F.	Temperature °C.	Viscosity Lb./hr.-ft.	Viscosity Centipoises
50	10	4.75	1.96
68	20	3.82	1.58
86	30	3.17	1.31
104	40	2.67	1.10
122	50	2.30	0.950
140	60	2.00	0.825
158	70	1.73	0.714

We therefore, conclude that the data given for kerosene on Page 192 of Heat Transmission is in error.

Rainy Days are here Again

See Our Exhibit
INTERNATIONAL PETROLEUM EXPOSITION
TULSA
MAY 18-25



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CONTINENTAL

FIELD OPERATIONS

Summarizing the Week's Developments

ILLINOIS—Production declined 9,234 bbl. per day from the previous week's peak. Average production of recent Devonian lime wells in the Salem field has fallen off about 50 per cent compared with average production in late January and in February. The big Devonian lime drilling campaign in Marion County has greatly lessened drilling for other oil-bearing formations in Marion and Fayette counties.

TEXAS: Gulf Coast—A new pool is expected in the Double Gum area in Liberty County on the basis of a favorable drill-stem test. Two wildcats on the Sparta-Wilcox trend are being given drill-stem tests.

Southwest Texas—Sparta-Wilcox wildcats in Bee and De Witt counties are being given tests this week, which are expected to give information favorable or otherwise, on the trend play. The Victoria and Kelsey fields were extended.

North Texas—The most extensive leasing campaign since that in East Texas is on in Montague, Clay, Wise and Jack counties, following recent important deep discoveries. At least eight locations were made for deep wells in Montague County.

Eastern Texas—Kaufman, Navarro and Van Zandt counties were given new locations for wells that will be drilled to the Woodbine sand and a Buda lime test was started in Falls County.

West Texas—A south extension to the North Cowden field in Ector County brings that field and the Foster field closer together. Eventually it is believed they will be joined, making a large producing area.

OKLAHOMA—A well in Tillman County was completed for a daily potential of 4,099 bbl., the biggest producer of the week in Oklahoma. A 3,375-bbl. well (potential production) was completed in the Cement field, Caddo County. Three oil wells were completed in the Byars pool, McClain County, the largest flowing 1,220 bbl. through choke in 16 hours. A Wilcox sand pool was opened north of Wewoka, Seminole County.

KANSAS—The Whelan pool, Barber County, inactive for several months, was extended ½ mile northeastward, forcing three offsets. A midway test found oil in chat, connecting the Bornholdt and North Bornholdt pools, McPherson County. South Snider pool, Stafford County, and South Gurney pool, Russell County, were extended. A gas pool was opened in Cowley County.

INDIANA—A wildcat in Section 19-3s-11w, Gibson County, with 1,100 ft. of oil in the hole, supposedly from St. Louis lime, is regarded as a very probable pool opener.

WYOMING—A well flowing 113 bbl. per hour in the Lance Creek field was the best of the week in the Rocky Mountain area. The limits of the Leo and Joss sands have been defined on the north in Lance Creek.

MICHIGAN—Production is steadily falling in the state and operators are looking around for favorable spots that will bring the state back to its position earlier in the year.

CALIFORNIA—Three wells are drilling to the ninth zone in the Montebello field, and if they are successful may result in a general drilling campaign which might eventually mean 100 wells producing from the deeper formation.

Completions in All Fields

(Week Ended March 23, 1940)

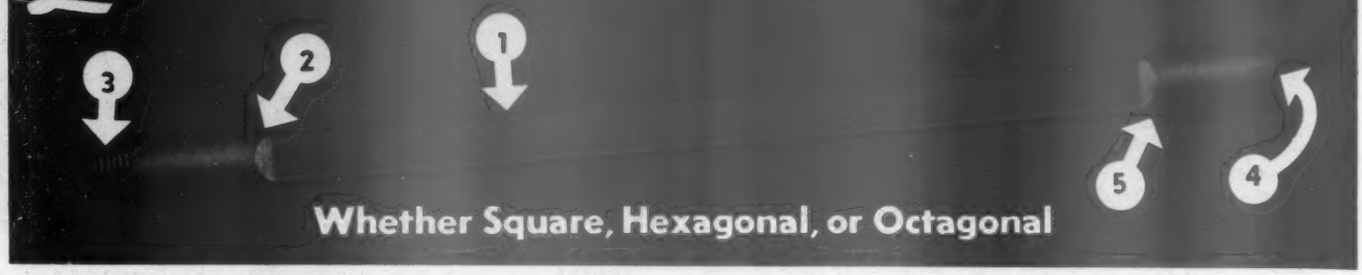
	Oil	Gas	Dry	Total	1940 total comp. to date	1939 total comp. to date
N. Y., Pa., and W. Va.	60	9	2	71	888	756
Ohio	3	6	6	15	215	204
Indiana	1	0	1	2	73	29
Illinois	55	0	7	62	778	772
Kentucky	2	0	4	6	85	125
Michigan	15	1	11	27	314	248
Kansas	22	0	3	25	320	248
Oklahoma	20	3	18	41	397	399
Texas:						
North Central Texas	31	2	15	48	734	497
West Texas	43	0	1	44	542	434
Texas Panhandle	7	4	0	11	140	88
East Central Texas	3	1	2	6	62	54
East Texas	6	0	0	6	69	165
East Texas Border	4	0	0	4	14	20
Gulf Coast Texas	26	0	3	29	313	298
Southwest Texas	34	1	16	51	541	519
Total Texas	154	8	37	199	2,415	2,075
North Louisiana	4	0	0	4	125	110
Gulf Coast Louisiana	14	0	5	19	183	138
Total Louisiana	18	0	5	23	308	248
Arkansas	1	0	0	1	50	61
Montana	1	0	1	2	32	25
Wyoming	1	0	0	1	36	26
Colorado	0	0	0	0	5	3
New Mexico	9	1	2	12	172	143
California	10	0	2	12	237	210
Total United States	372	28	99	499	6,325	5,572
Total previous week	337	46	117	500		
Week ended Mar. 25, 1939	282	25	108	415		

Outstanding Fields—Highlights

(Week Ended March 23, 1940)

FIELD—	Rigs up	Wells drlg.	Weekly oil completions	Initial prod.	Total No. oil wells	Daily av. prod.
TEXAS						
K.M.A.	27	36	7	4,872	1,291	39,497
Wasson-Bennett	12	70	17	16,545	720	31,903
Ector County	11	87	13	14,526	2,036	57,000
Pecos County	2	19	0	0	1,248	36,450
Jones County	8	20	1	274	599	8,200
East Texas	9	13	6	190	25,996	397,000
OKLAHOMA						
St. Louis	4	19	1	107	873	32,000
Cement	6	23	2	449	297	6,600
KANSAS						
Bemis	2	5	2	477	279	7,800
Burnett	2	11	2	1,466	75	3,750
Silica	2	10	4	831	613	14,350
Trapp	1	12	1	935	496	12,800
NEW MEXICO						
Lea County	7	60	6	2,509	2,409	107,360
Eddy County	12	63	2	120	535	16,530
LA-ARK-TEX						
Cotton Valley, La. (deep)	1	6	0	0	154	14,505
Magnolia, Ark.	1	6	1	408	99	19,880
Golden Meadow, La.	1	12	2	406	66	8,210
MICHIGAN						
Freeman-Redding	1	11	1	85	146	13,416
Kent County	2	23	2	70	287	18,357
CALIFORNIA						
Montebello	2	13	1	240	360	20,400
ILLINOIS						
Salem	16	112	25	31,317	1,774	286,011
Louden	4	28	2	230	1,368	75,842
Other fields	63	242	28	8,775	3,559	76,141
Old fields	....	....	....	.....	.....	8,527
MISSISSIPPI						
Tinsley	1	11	3	2,220	30	8,015

Let's Analyze a BAASH-ROSS



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There's EXTRA VALUE in BAASH-ROSS Forged Upset Kellys — extra value which shows up in service but cannot be readily seen with the eye. Guided by many years of experience in making kellys and a thorough knowledge of the modern field conditions under which they are used, BAASH-ROSS have determined the qualifications which kellys of any shape must have in order to stand up under these conditions.

Just as your automobile dollar buys a better car today than it did ten years ago, so does the money you invest today in a BAASH-ROSS Kelly bring you a BETTER product than ever before, at no advance in price. All BAASH-ROSS Forged Upset Kellys now conform to these improved specifications:

The Right Steel . . .

Metallurgical improvement **comes from the use of restricted analysis-range, fine grained alloy steels that are both economical and readily available. S.A.E. X-3140 nickel chromium steel and S.A.E. 4140 chromium molybdenum steel are two grades of steels that have proved most satisfactory.**

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. . . in one operation after forging is a standard BAASH-ROSS specification. It is essential to remove forging and straightening strains, and to produce required physical properties uniformly throughout the kelly.

Precision Alignment of Joints . . .

The vital importance of correct joint alignment has now become recognized. The alignment of the projected axis of the threaded joints of BAASH-ROSS Forged Upset Kellys is held to within 1/2-inch in 40 feet, checked by surveying from joint to joint.

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. . . insures balance at high rotation speed. Standard BAASH-ROSS bore specifications for kellys are: 1 — Bore diameter, plus 1/32"—minus 0"; 2 — Wall thickness not to vary more than plus or minus 1/4" from the theoretical correct, checked by surveying; 3 — A ten-foot test bar 1/8" smaller than the bore must pass through freely, without binding.

Additional Heat Treatment of Joint Ends . . .

In addition to the full-length normalizing heat treatment, the ends are further heated, oil quenched, and drawn to a hardness of 285-310 Brinell. The maximum toughness thus developed in the threaded sections is vitally important to the service life of kellys.

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Illinois Production Declines; Indiana's New Pool Prospect

By STAFF CORRESPONDENT

MATTOON, Ill., Mar. 25.—Production in the Illinois field fell off 9,234 bbl. per day in the past week, compared with the previous week's peak output of 455,755 bbl. per day. The average daily production for the week ended Saturday, March 23, was 446,521 bbl. per day.

Salem produced an average of 286,011 bbl. daily, a drop of 5,013 bbl. from the previous week's peak for that field. Louden produced 75,842 bbl. a day, a gain of 656 bbl. Other basin pools produced 76,141 bbl., or 3,771 bbl. per day less than in the previous week. The old fields of the state fell off 1,106 bbl. a day to an average of 8,527 bbl.

The drain on the Devonian lime in the Salem field began to show seriously last week in Section 20-2n-2e, in which section the Devonian discovery well of Kingwood Oil Co. was completed last November in the NW NE Section 20. The big pull on the lime pay in this section came in February and last week wells of 90 and 96 bbl. in initial 24-hour production were among the completions. The largest Devonian lime completions of the week were in Section 32, where wells of 4,600, 7,000 and 3,878 bbl. in potential production were credited only with their short-time flow on their initial production day. The average production of the 22 wells completed in the Devonian in Salem during the week in review was 1,320 bbl. but their actual initial potential production averaged 1,891 bbl.

A Devonian lime well, Hollingsworth's No. 11 Kalkbrenner, in the SW Section 5-1n-2e, Centralia townsite, was given a 120-qt. shot of nitroglycerin and its production was increased from 150 to 1,100 bbl. per day. Originally it was acidized with 6,000 gal.

Kingwood Oil Co.'s No. 1 Wilson, in Section 6-6s-7e, Hamilton County, 5 miles southeast of McLeansboro, pumped 110 bbl. one day and 104 bbl. the next from Cypress sand. The well opened a pool, but its completion was held back until a pipe line to Dale was completed. The same company has derrick up for an offset, No. 1 Dodd, SE SE NW Section 6-6s-7e, but bad roads have prevented the moving of drilling equipment to the site.

Following were the completed wells of the week, the initial production representing 24 hours, unless otherwise given.

Fayette County

In the Louden field, Fayette County, Carter Oil Co.'s No. 1 Bertha Algood, SE NE NW Section 2-8n-3e, was shot with 30 qt. at 1,510-22 ft., Cypress sand, and swabbed 220 bbl. W. C. McBride, Inc.'s No. 1 Logue, SE SW NW Section 8-7n-3e, shot with 10 qt. pumped 37½ bbl. from Paint Creek sand topped at 1,484-98 ft.; an old well deepened. Shell Oil Co., Inc.'s No. 7 Jedamski, NE NE SW Section 21-7n-3e, shot with 21 qt. at 1,565-77 ft., Cypress sand, pumped 10 bbl.

In the St. James pool in Fayette County Ohio Oil Co.'s No. 9 S. W. and A. E. Schwarm, SE NW NW Section 31-6n-3e, shot with 10 qt. at 1,615-20 ft., Cypress sand, pumped 51 bbl. Texas Co.'s No. 5 McKee, NE NW NW Section 7-6n-3e, had Cypress sand top at 1,575 ft., total depth 1,584 ft. and pumped 77 bbl. a day without a shot.

In Shelby County Seaboard and Wiggins' No. 1 Miller, SW SW SE Section 32-11n-2e, topped Devonian lime at 2,924 ft., and drilled to 3,083 ft. It was dry and abandoned.

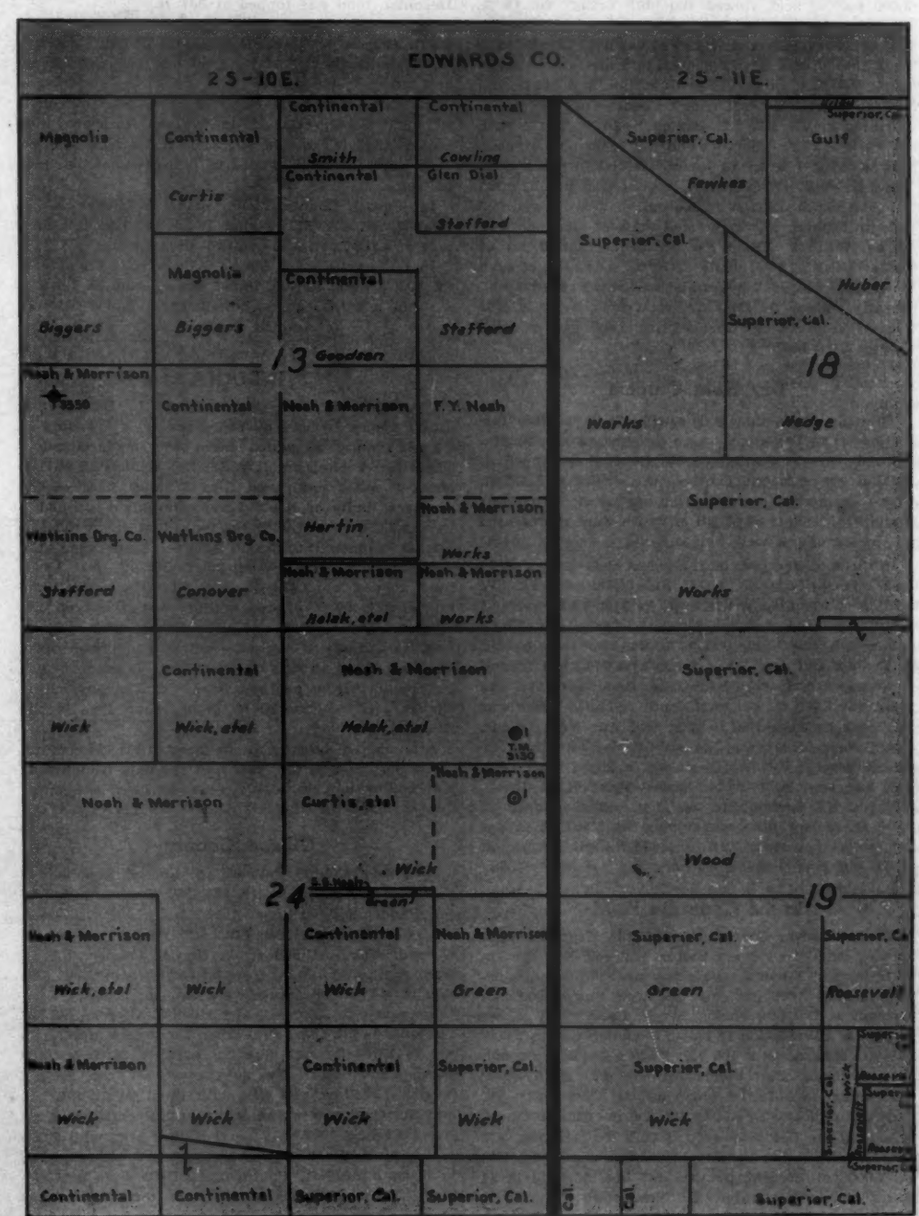
In Jasper County Pure Oil Co.'s discovery well, No. 1 Warren Consolidated, CE½ NE NW Section 33-6n-10e, which had McClosky pay at 2,822-28 ft., flowed an initial production of 348 bbl. through 1-in. tubing choke and was completed.

In Richland County, Dundas field, Pure Oil Co.'s No. 1 Grove, CW½ SW NE Section 31-5n-10e, flowed 217 bbl. naturally, through 1-in. choke, from pay at 2,819-24 ft. Pure's No. 1 Kropp B, CW½ SE SE Section 6-4n-10e, pumped 60 bbl. from pay at 2,883-90 ft., Cypress conglomerate.

In Clay County Pure Oil Co.'s No. 1 Behymer, CE½ NE SE Section 33-2n-8e, Enterprise pool, was acidized with 2,000 gal., and pumped 98 bbl. from pays at intervals from 3,016 to 3,084 ft.

Marion County

In the Salem field, Marion County, 22 oil wells were completed in the Devonian lime and three in other pays. W. R. Curry's No. 9 Young Strip, SE SE SE Section 20-2n-2e, had Devonian at 3,335 ft., pay at 3,390-3,416 ft., and flowed 96 bbl. D. & H. Drilling Co.'s No. 2 Young Strip, SE SE SE Section 20-2n-2e, was acidized with 3,000 gal. in pay from 3,390 to 3,483 ft., and flowed 290 bbl. through tubing and casing. Magnolia Petroleum Co.'s No. 85 J. H. Young, NE NE SE Section 20-2n-2e, pay at 3,427-52 ft., acidized with 5,000 gal., flowed 120 bbl. in 8 hours and died. It pumped 92 bbl.



Midcontinent Map Co., Mattoon

Noah & Morrison's No. 1 Barnes, SE NE NE Section 24-2s-10e, 6 miles from the nearest production, and about 5 miles southwest of Albion, found saturation in McClosky lime topped at 3,130 ft. On a production test the well flowed 5 bbl. of oil per hour. Total depth is 3,240 ft.

in 24 hours. Magnolia's No. 33 W. B. Young, SE cor. SW NE Section 20-2n-2e, pay at 3,388-3,413 ft., pumped 105 bbl. Ohio Oil Co.'s No. 39 M. Young heirs, SW cor. NE SW Section 20, pay at 3,408-53 ft., acidized with 5,000 gal., flowed 1,838 bbl. Texas Co.'s No. 29 N. Young, pay at 3,395-3,429 ft., acidized with 1,000 and 3,000 gal., flowed 105 bbl. Texas' No. 19 Chapman, SE NW SW Section 28-2n-2e, pay at 3,425-50 ft., acidized with 5,000 gal., flowed 1,757 bbl. Texas' No. 25 N. Lee, SW SW SW Section 28-2n-2e, pay at 3,391-3,425 ft., acidized with 5,000 gal., flowed 2,597 bbl. Ohio Oil Co.'s No. 20 M. J. Young, NE NE NW Section 29-2n-2e, pay at 3,395-3,426 ft., acidized with 5,000 gal., flowed 1,056 bbl. Ohio's No. 35 M. Young heirs, NE SE NW Section 29-2n-2e, pay at 3,385-3,430 ft., acidized with 5,000 gal., flowed 2,049 bbl. Texas Co.'s No. 15 Fossieck, NE NE SW Section 29-2n-2e, pay at 3,370-3,410 ft., 5,000 gal. of acid, flowed 4,340 bbl. Texas' No. 26 W. Friederich, NE NW SW Section 29, pay at 3,370-3,406 ft., 5,000 gal. of acid, flowed 1,855 bbl. Texas' No. 27 Friederich, NW SW SW Section 29-2n-2e, pay 3,360-98 ft., 5,000 gal. of acid, flowed 2,240 bbl. Texas' No. 25 McCollum, SW SE SE Section 29, pay at 3,400-38 ft., 5,000 gal. of acid, flowed 1,260 bbl. Texas' No. 16 R. Shanafelt, pay 3,385-3,419 ft., flowed 485 bbl. naturally, acidized with 3,000 gal. it flowed only 266 bbl. Texas' No. 17 R. Shanafelt, NW cor. NE NE NE Section 29, pay at 3,385 ft., total depth 3,425 ft., 5,000 gal. of acid, flowed 490 bbl. Texas' No. 18 R. Shanafelt, NW cor. NE NE NE Section 29, pay at 3,386-3,415 ft., 3,000 gal. of acid, flowed 681 bbl. Texas' No. 5 S. D. Branch, SE SE NE Section 32-2n-2e, pay at 3,440-68 ft., 5,000 gal. of acid, flowed 667 bbl. in 3 hours, and was rated at 4,600 bbl. a day. Texas Co.'s No. 10 E. Farthing-A, NE NW SE Section 32-2n-2e, pay topped at 3,419 ft., total depth 3,460 ft., 5,000 gal. of acid, flowed 3,515 bbl. in 12 hours. Texas Co.'s No. 8 E. Hays, NE NW NW Section 32-2n-2e, top of pay at 3,305 ft., total depth 3,355 ft., 5,000 gal. of acid, flowed 352 bbl. in 3 hours and was rated at 2,465 bbl. per day. Texas' No. 11 F. Miller, NW NE SE Section 32, top of pay at 3,430 ft., total depth 3,470 ft., 5,000 gal. of acid, flowed 854 bbl. in 3 hours and was rated at 3,878 bbl. per day. Wiser Oil Co.'s No. 11 Weems, SW NW NW Section 33-2n-2e, pay 3,450-68 ft., 5,000 gal. of acid, flowed 2,315 bbl.

Dry Hole Outpost

The only completion in Township 2n-2e in other formations than Devonian, was a dry hole. No. 1 Martin, SW SW SW, in Section 10, St. Louis lime topped at 2,255 ft. tested water. The hole was drilled to 2,475 ft. There was no pay reported from any of the formations found in the Salem field, all of which were represented on the log of the well.

In the southern part of the Salem field in Township 1n-2e, Texas Co.'s No. 10 C. Friederich, NE SE SW Section 6, was shot with 10 qt. in Aux Vases sand at 1,844-72 ft. and pumped 840 bbl. Texas' No. 13 G. Johnson, NW SW SE Section 16, was shot with 105 qt. in Benoist and Aux Vases sands at 1,755-1,860 ft. and flowed 1,230 bbl. in 16 hours. Ste. Genevieve lime was topped at 1,860 ft. and total depth 1,871 ft. There was no break between the Benoist and Aux Vases sands. Texas' No. 1 M. Murray, NE NW SW Section 7, had McClosky lime at 2,076-84 ft. It was acidized with 1,000 gal., and pumped 210 bbl. Texas' No. 1 R. N. Davis, NW NE NE Section 21, was dry and abandoned at 2,655 ft. Salem lime was topped at 2,365 ft. Cores had been taken from 1,915 to 2,603 ft., all showing oil signs, but also showing water.

In the Centralia Field

In the Marion County side of the Centralia field Hawley Oil Corp.'s No. 2 Storer, SW cor. NW Section 18-1n-1e, had Devonian lime pay at 2,901-08 ft., acidized it with 2,000 gal., and the well flowed 800 bbl. through a 37/64-in. choke. W. F. Lacey's No. 2 fee, in SE SW SW Section 18-1n-1e, Devonian pay at 2,900-10½ ft., acidized with 500 gal., flowed 240 bbl. through 1/16-in. choke. Bert Fields' No. 8 M.&I.R.R., SW SW SW Section 18-1n-1e, Devonian pay at 3,898-2,912½ ft., 2,000 gal. of acid, flowed 212 bbl. On the Clinton County side of the field Stewart Oil Co.'s No. 1 Daum, SW cor. NE SE Section 13-1n-1w, Devonian pay at 2,901-06 ft., 2,000 gal. of acid, pumped 147 bbl. of fluid in 24 hours, some of it water. Oil Production Co.'s No. 1 Garbe, in NW SE NE Section 13-1n-1w, Devonian pay at 2,899½-2,913½ ft., 500 gal. of acid, flowed 422 gal. of fluid per day, 10 per cent basic sediment and water. Hughes Petroleum Co.'s No. 1 Peiffer, NE NE SE Section 13-1n-1w, Devonian pay at 2,906-12 ft., treated with 2,000 gal., flowed 262 bbl. of oil. Hughes' No. 1 Pfaff, NE NE SE Section 13-1n-1w, Devonian pay at 2,903-12 ft., 2,000 gal., flowed 227 bbl. J. B. Harnes' No. 1 Gartner-Cline, NE NE SE Section 13-1n-1w, Devonian pay at 2,893-2,902 ft., 2,000 gal. of acid, flowed 144 bbl. Taylor Drilling Co.'s No. 1 Baker, SW SE SE Section 12-1n-1w, Devonian pay at 2,898-2,907 ft., 1,000 gal. of acid, flowed 165 bbl. in 3 hours then 702 bbl. in 24 hours. S. W. S. Oil Co.'s 1 Flora Noll, CN½ SE SE Section 12-1n-1w, pay at 2,897-2,917 ft., 750 gal. of acid, flowed 720 bbl. through ¾-in. tubing choke. Scott-Carey Oil Co.'s No. 1 Quick, SW cor. NE NE SE Section 12-1n-1w, 750 gal. of acid, flowed 1,000 bbl. the first 24 hours, but only 49 bbl. the second 24 hours. F. Osborne and others' No. 1 Koelin, SW SW SE Section 12-1n-1w, pay at 2,887-2,929 ft., 500 gal. of acid, flowed 602 bbl. J. D. Ethridge's No. 1 Brown, NE cor. SW SE NE Section 13-1n-1w, pay at 2,906-12 ft., 2,000 gal. of acid, flowed 145 bbl. E. C. Lane's No. 1 Butner, NE NE SE Section 13-1n-1w, pay at 2,901-05 ft., flowed 500 bbl. naturally in 12 hours; was then acidized with 2,000 gal. and flowed only 80 bbl. in 24 hours. There are 42 wells drilling to the Devonian in the Centralia townsite field.

In Monroe County Morris and others' No. 1 Gummersheimer, SW NW NW Section 31-1n-10w, topped Trenton lime at 792 ft. and was drilled to 832 ft. The test showed nothing but water and was abandoned. Devonian lime was topped at 557 ft.

In Wabash County Central States Oil Co.'s No. 1 D. D. Briner, NW NE SE Section 5-1n-13w,, was dry and abandoned at 2,787 ft. Fredonia lime was topped at 2,719 ft.

In Wayne County D. W. Humphries' No. 1 Wagner. NE SW SW Section 27-1s-7e, had Rosiclare lime top at 3,262 ft., total depth 3,335 ft. It was acidized with 2,000 gal. and pumped 90 bbl. of oil and a show of water.

In Wabash County, Mode, Bruce & Lacey's No. 1 Keneitt, SE SW SE Section 19-1s-12w, had Rosiclare lime at 2,368-72 ft. and pumped 40 bbl. of oil.

In Jefferson County Alma Oil Co.'s No. 1 Copple, SE SE NW Section 9-1s-2e, found Bethel sand at 1,915-23 ft., shot it with 5 qt. on bottom and pumped 105 bbl

(Continued on Page 226)

INDIANA

EVANSVILLE, Ind., Mar. 25.—A. L. Braden and others appear to have opened a pool in a township in Gibson County in which there was no production. Their No. 1 Simpson, NW SE NE Section 19-3s-11w, about 9 miles south and then 2 miles west of the southern limits of the old Princeton field, opened a pay at 2,690 ft. and with the bit only 1 ft. in the formation, supposed to be in the St. Louis lime, the well filled up 1,100 ft. with 36-gravity oil. Aux Vases sand topped at 2,472 ft. and Ste. Genevieve lime topped at 2,480 ft. offered nothing in the way of production. The Braden well is about 4 miles east of Fotiades and others' discovery well of a couple of weeks ago, completed in Section 21-3s-12w. It made a 300-bbl. pumper from pay at 2,706-11 ft. The pay in the Braden well is only 16 ft. higher than that in the Fotiades well.

A number of other wells in the southwest fields are in the near-completion class, but the only completions recorded in the past week were a 5-bbl. well in Spencer County and a dry hole in Dubois County.

Gibson County

In Gibson County Papoose Oil Co. set pipe at 148 ft. in No. 4 Cooper A, NE SW SW Section 13-3s-14e: Joe Bander was drilling at 485 ft. in No. 8 Cooper, SE SW NE Section 13-3s-14w, and Bander and others were drilling at 1,060 ft. in No. 31 Cooper, 150 ft. from south and 100 ft. from east lines of SW SE Section 13-3s-14w. The above were new operations.

Spitznagle & Moore's No. 2 Huston, SE cor. SW NE Section 8-3s-13w, was shut down for orders after drilling to 2,816 ft. and plugging back to 2,100 ft. Joe Bander and others' No. 30 Cooper, SW cor. SE SE Section 13-3s-14w, was shot with 10 qt. at 2,510-13 ft., and the crew was cleaning out. Continental Oil Co.'s No. 4 Keck, SE SW SW Section 26-3s-14w, with 2,000 ft. of oil in the hole was being rigged up to pump, total depth 2,517 ft. Continental Oil Co.'s No. 1 Kleiderer, NW SE NW Section 26-3s-14w, total depth 3,000 ft. and plugged back to 2,778 ft. was being rigged up to pump. No production test had been made. No. 5 Keck, SE cor. SW Section 27 had 2,400 ft. of oil in the hole at a total depth of 2,801 ft. and was being made ready to pump.

Fotiades and others' No. 1 Gates, C E½ W½ NE Section 29-3s-12w, had Cypress sand top at 2,373 ft. and was drilling at 2,480 ft. with no showing of oil. O'Mara and others' No. 1 Maier, SE NE SW Section 21-3s-13w, had Glen Dean lime at 2,216 ft. and was drilling ahead. Midwest Development Co.'s No. 1 Brock, SE cor. SW SE Section 10-2s-9w, was shot with 120 qt. in Cypress sand at 1,346-88 ft., and the hole filled 550 ft. with oil in 10 hours. Sloss & Walls' No. 1 Oakland City College, NW NE SE Section 13-2s-9w, had Ste. Genevieve lime top at 1,536 ft. and was drilling at 1,565 ft.

A. J. Walker was rigging up standard tools at No. 1 Schmidt, NW NE NW Section 24-3s-9w.

(Continued on Page 217)

WESTERN KENTUCKY

OWENSBORO, Ky., Mar. 25.—Two oil wells and four dry holes were the results of drilling in the western Kentucky fields during the week. A location has been made in Todd County, 7 miles north of Elkton for a Devonian lime test by Noe & Myers on the Harris farm.

Following were the completions and new operations:

Breckenridge County, Glen Dean district: H. E. Morgan and others' No. 1 Thad Matthews, dry hole through Bethel sand, total depth 400 ft. Van Zandt district: H. E. Morgan and others' No. 2 Ora Burton, a location.

Daviess County, Handyville district: A. V. Smith and others' No. 2 R. Y. Cravens, estimated 20-bbl. well in Jones sand 1,334-44 ft., but drilling at 1,364 ft. for McClosky lime. Master Oil Co.'s No. 1 W. W. Davis, estimated a 10-bbl. well in Jett sand, shot with 80 qt. at 1,214-20 ft., total depth 1,838 ft., but plugged back to 1,235 ft. Red Hill School district: Sunflower Oil & Gas Co.'s No. 13 R. L. Purcell, abandoned location.

Hancock County, Cloverport district: Lincoln Petroleum Co.'s No. 2 C. A. Johnson, a dry hole through McClosky lime, total depth 517 ft. John Richards and others' No. 5 Margaret McGavock, rigging up. Patesville district: Paul A. Turner's No. 2 C. S. Nix, a location. Saunders School district: W. J. Flesher's No. 3 J. W. Saunders, shut down for a shot in Barlow sand at 424-71 ft., total depth 494 ft.

Henderson County, Corydon district: Sun Oil Co. and Kentucky Natural Gas Co.'s No. 3 Corydon unit, 125-bbl. well in McClosky lime, total depth 2,603 ft.; acidized with 1,000 gal. Sun Oil Co. and Kentucky Natural Gas Co.'s No. 3 George F. Trigg, rigging up rotary.

(Continued on Page 216)

EASTERN KENTUCKY

ASHLAND, Ky., Mar. 25.—No new locations or completions are included in the week's report of activities in eastern Kentucky.

In Floyd County Kentucky-West Virginia Gas Co. was drilling at 340 ft., in slate, in No. 585 on the A. C. Webb land on Sanson Fork of Prater Creek, and is building rig for No. 586 on the Levi Mitchel land on the Mitchell Branch of Mud Creek. The same company is building rig for No. 5262 on the W. R. Hall land on Jacks Creek of Left Beaver, and has location for No. 5265 on the James Sturgill farm of Keathley Branch of Toler Creek, and was drilling at 1,608 ft., in sand, in a deepening operation in No. 5253 on the George McKinney tract on Deadening Fork of Toler Creek.

In Martin County Kentucky-West Virginia Gas Co. was drilling at 1,281 ft. in Salt sand, in No. 583 on the Wilson Short land on Rockcastle.

In Knott County Inland Gas Co. had reached 1,945 ft. in slate and shells in No. 212 on the W. H. Smith and others land on Perkins Branch.

(Continued on Page 213)

OHIO

XENIA, Ohio, Mar. 25.—Fifteen completions were reported in the Ohio fields covered by this report, six gas wells, three oil wells, and six dry holes. In southwestern Ohio, Greene County, Sun Oil Co. is making another sub-Trenton test. The test is 7 miles southeast of Xenia in Caesar Creek Township, on the William M. Henry tract in Military Survey 2473. It is now drilling at 1,025 ft.

In Guernsey County, Valley Township, Jewell Co.'s No. 1 H. C. Robins and others, Section 11, is a gas well in the Berea, gaging 305,000 cu. ft. at 1,301 ft.

In the Newark field, Licking County, two gas wells and two dry holes were completed in the Clinton sand.

(Continued on Page 234)

Texas and Louisiana Gulf

By NEIL WILLIAMS

New Pool in Liberty County And a Prospect in Louisiana

HOUSTON, Tex., Mar. 25.—The discovery of a new field in Liberty County, testing of two wildcats on the Sparta-Wilcox trend, and the apparent discovery of new producing horizons in proven fields marked up an interesting week of development in the Gulf Coast district.

Titantic Oil Co., Hebert & Smith's No. 1 E. W. Boyt, a wildcat, in the Double Gum area, Liberty County, was cleaning out through a 7/64-in. choke, flowing an unestimated amount of high-gravity oil and gas. Tubing pressure was 2,125 lb. and casing pressure 2,135 lb. This well, which has been looked upon as a probable pool opener for several weeks, drilled in a sidetracked hole to a total depth of 8,865 ft., and screen and liner were set to test a broken sand section logged by an electrical survey at 8,775-8,823 ft. and at 8,840-65 ft. The survey showed a maximum of 2 ohms resistivity and 50 mv. porosity. Production is from the lower Frio sand. Seven-inch casing was recently cemented at 8,700 ft. following an electrical survey which showed possible production in the upper Frio formation at 8,566-83 ft. and at 8,596-8,606 ft.

The field is about 4½ miles east of the old Hankamer field in the H.&T.C. Survey 9. Considerable protection acreage is held by major companies and several leases acquired recently call for early drilling obligations.

Sparta-Wilcox Trend

Interest in the Sparta-Wilcox trend was being revived as Strake Petroleum Co. made a series of production tests in No. 1 Winnie Poole, situated in the Lissie area, northeastern Wharton County. The well is bottomed at 10,110 ft., and 5½-in. casing was cemented on bottom. The Wilcox formation was topped at approximately 9,700 ft., and the crew is testing a broken sand section at 9,938-10,050 ft. The first test was made at 9,938-55 ft., and the well is reported to have flowed 3 bbl. of fluid per hour for approximately 3 hours, 30 per cent of which was oil and 70 per cent wash water. At the end of the 3 hours the well began to flow 100 per cent salt water, and it has been killed preparatory to retesting. While flowing, the well showed a maximum of 300 lb. working pressure on the tubing and 800 lb. shut-in casing pressure.

In the Anchor field, Brazoria County, Humble Oil & Refining Co. was testing No. 1 Galznik and Taylor, an inside location, northeast and southwest of production. The hole was plugged back from a total depth of 10,994 ft. to 10,705 ft., and is being tested through perforated casing at 10,695-10,700 ft. Glenn McCarthy's No. 1 Galaznik, approximately 2,000 ft. southeast of production, flowed 496 bbl. of 34.8-gravity oil on a 24-hour potential test. Tubing pressure was 2,750 lb. Production is from perforated casing at 10,480-85 ft.

In the Chocolate Bayou field, Brazoria County, Glenn McCarthy's No. 1 Andrau, approximately 1⅛ miles northwest of the discovery well, is fishing for bit at a total depth of 11,468 ft. An electrical survey showed sand at 11,376-11,413 ft. with 150 mv. porosity and 15 to 20 ohms resistivity, while another sand at 11,459-68 ft. showed 150 mv. porosity and 6 to 7 ohms resistivity on normal curve.

Location for another wildcat in the Needville area, Fort Bend County, was announced by Tide Water Associated Oil Co. The well will be drilled on the George Armstrong lease in the James Scott Survey, about 4 miles south of Needville.

On the northwest flank of the Fannett dome, Jefferson County, Gulf Oil Corp.'s No. 1 P. E. Bordages topped oil sand at 8,214 ft., and sand was cored to a total depth of 8,254 ft. Casing, 5½-in., was cemented at 8,253 ft. This is third deep test on the flank of the structure.

South China Further Defined

The northeast-extension area of the South China field, Jefferson County, was further defined as J. K. Hughes Oil Co. was expected to abandon No. 1-A Guiterman at a total depth of 7,900 ft. The well is in the C. T. Taylor Survey, just south of production on the east side of the field. Salt-water sand was logged by an electrical survey at 7,640-7,710 ft. In the same area, Titanic Oil Co. is testing No. 2-B Guiterman through perforated casing at intervals from 7,498 to 7,536 ft., while in the field proper Titanic Oil Co.'s No. 2 Broussard was completed at a total depth of 7,879 ft. for an initial production of 209 bbl., flowing through a ¼-in. choke.

Deep production from a new sand on the northwest flank of the Esperson dome, Liberty County, was indicated as General Crude Oil Co.'s No. 20 Davis logged sandy shale with a showing of oil at 7,054-77 ft. and sand showing gas at 7,077-82 ft. Casing, 8⅝-in., was cemented at 7,181 ft. The well is located in the D. L. Kokernot Survey, and is the second well to be drilled on the northwest flank, being about 400 ft. northeast of the company's No. 9 Davis, which blew out and created several weeks ago at a total depth of 8,305 ft.

In the Rosenberg field, Fort Bend County, Humble Oil & Refining Co. was preparing to abandon No. 1-B Miller, northwest of the discovery well. The well was drilled to a total depth of 8,530 ft., and had been given several production tests at intervals from 7,700 to 8,200 ft. which showed salt water, gas, and some distillate.

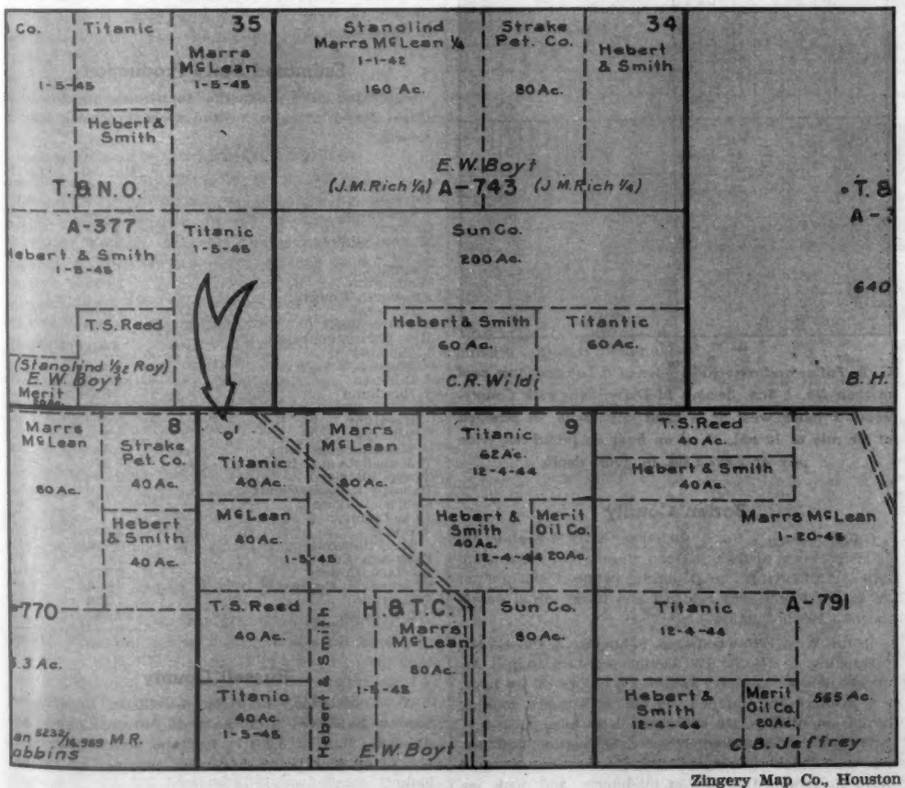
Mackhank Petroleum Co.'s No. 1 Wisian, 1,300 ft. west of the discovery well of the Hiljie field, Wharton County, is cleaning out, flowing wash water and oil through a ⅛-in. choke. Tubing pressure was 930 lb. and shut-in casing pressure 2,000 lb. The well is testing sand at 5,225-32 ft., the total depth.

Louisiana Coast

Along the Louisiana coast interest was centered on the Neal prospect, northwestern Beauregard Parish, where Atlantic Refining Co. was testing No. 1 A. D. Whitmer. Although unconfirmed, the well was reported to be flowing wash water and oil with a taste of salt water while cleaning out. It has been drilled as a "mystery" but it was reported that 5½-in. casing was cemented on bottom, and it is assumed that the well is testing the Tertiary-Wilcox sand at 8,400-35 ft., where an electrical survey is reported to have shown favorable indications. Top of the Wilcox formation, which is subject to correction, was 8,315-45 ft. The well is in Section 26-3s-11w, and is the second drilled on the prospect. It is about 2 miles southeast of No. 1 Rice Land & Timber Co., which was abandoned at 8,519 ft. The successful completion of this well would open the second field for Beauregard Parish and the third field in the state to produce from the Wilcox.

Production from a deeper sand was indicated for the southwest flank of the Bayou Blue dome, Iberville Parish, as Superior Oil Co. prepared to test No. 2 Schwing. The well topped salt at 7,006 ft., and drilled the formation to a total depth of 7,011 ft. Six-inch casing was cemented at 6,000 ft., after an electrical survey showed 20 ohms resistivity in oil sand at 6,928-34 ft., and 27 ohms resistivity in sand at 6,934-82 ft. The well is about 900 ft. southwest of the company's No. 1 Schwing, recently completed in a sand at 5,000 ft.

(Continued on Page 232)



Zingery Map Co., Houston

Titanic Oil Co. and others' No. 1 E. W. Boyt, the discovery well of the Double Gum field, in Liberty County

Kansas Developments

By
DAL DALRYMPLE

Extend, Revive Whelan Pool; Two Bornholdt Areas Joined

The first week of spring in the Kansas field was featured with the discovery of new oil and gas pools, revival of the Whelan pool, linking of the Bornholdt pools and extension of other proven areas. Several large producers were completed in old fields and numerous new wells were started, including several wildcats.

The Whelan pool in Barber County, inactive for several months, was revived and extended by W. J. Coppinger, Medicine Lodge operator, whose No. 1 Whelan, C SW NW Section 29-31-11w, found rich oil and gas pay. It found pay in chat at 4,331 ft., was bottomed at 4,385 ft., and on initial tests flowed 30 bbl. of 31.5-gravity oil an hour, with gas estimated at 3,000,000 cu. ft. No water was showing. Potential test was to be made after setting of tubing. It is the highest well on structure in the field. Completion as a producer will require offsets on acreage held by Olson Oil Co., Tulsa; James Davis, Wichita, and C. L. McMahon, Tulsa. The new well extends the field ½ mile northeastward. Operators in the extension area have agreed on 40-acre spacing. There are nine producers in the older part of the field with total potential of 4,959 bbl.

Linking of Bornholdt and North Bornholdt pools in McPherson County was indicated at Republic Natural Gas Co.'s No. 1 Mattson, CSL SW SW Section 19-20-5w, about midway between the two areas. It found chat at 3,270 ft. and oil rose 3,100 ft. in the hole after the drill had penetrated 41 ft. of pay. Operators were expected to deepen a few feet and two or three others were near completion as the week ended.

Champlin Refining Co.'s No. 1 Smith, NE NE SE Section 17-21-11w, apparently has extended the South Snider pool, Stafford County, ¼ mile northwestward. Oil rose 2,000 ft. in the hole in 1½ hours after plug in 7-in. casing was drilled out to 3,442 ft. in Arbuckle lime. If completed as a producer it will be the third well in the pool.

Skelly Oil Co.'s No. 1 Ben Rein, CWL SW SW Section 25-14-14w, extended basal sand production in the South Gurney pool, Russell County, ½ mile northward. Bottomed at 3,139 ft. in sand, it made initial potential of 593 bbl. of oil daily.

Markey, Milton, Jones & Mission Oil Co. opened a gas pool at their No. 1 Hunt, SW SW NE Section 16-34-5, about 8 miles east of Arkansas City, Cowley County. It found sand at 1,755-56 ft., total depth, and gaged 2,500,000 cu. ft. of sweet gas daily. Flow was obstructed by caving hole, it was said. Casing was to be run and the hole cleaned out for completion test. Nearest gas production is in the Arkansas City field.

Bells-Wells Oil Co., Miami, Okla., and E. T. Lindsay, Arkansas City, have started work at their No. 1 LeBlanc, C S½ SW NW Section 35-6s-1w, wildcat in Cloud County, in the Salina basin. Location is on a Carter Oil Co. farmout, about 14 miles southeast of Concordia and 70 miles northeast of the Lindsborg pool, McPherson County, nearest production.

Maryatt & Hackathorn's No. 1 Harriman, SE Section 27-34-14, Montgomery County, was reported producing 22 bbl. of oil daily, and operators were cleaning out.

Ellis County

Two producers in the Burnett pool, Ellis County, were completed. Dickey Oil Co.'s No. 2 Kollman, S½ SW NE Section 18-11-17w, had Arbuckle lime at 3,360-70 ft., total depth. At 3,360 ft., oil rose 2,600 ft. in 4 hours and the well was completed for the maximum allowable of 3,000 bbl. daily.

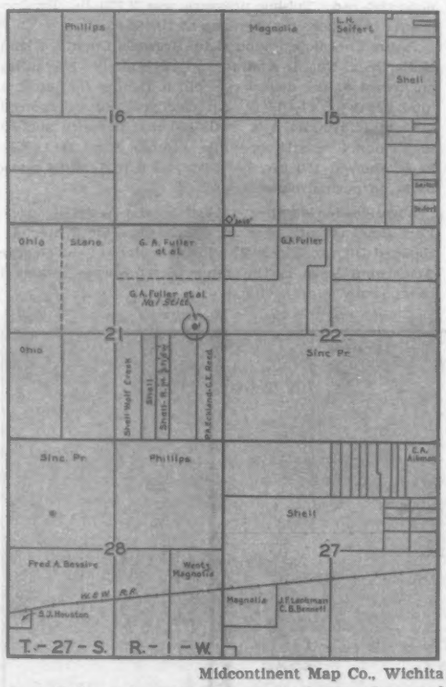
Earl Wakefield's No. 1-E Burnett, W½ SE NE Section 1-11-18w, had Arbuckle lime at 3,586-90 ft., total depth, was acidized and made calculated potential of 1,116 bbl. of oil.

J. J. Hall's No. 1-A Smith, C W½ NW NE Section 14-12-16w, Blue Hill area, found Lansing lime pay at 3,085-90 ft.; swabbed 14 bbl. of oil an hour; acidized with 8,000 gal., and pumped 75 bbl. hourly. Initial potential was 2,683 bbl. Total depth was 3,103 ft.

Twin Drilling Co.'s No. 3 Karlin, C SE SE Section 6-12-17w, penetrated Arbuckle at 3,639-72 ft., total depth. It pumped 127 bbl. of oil in 8 hours; making potential of 380 bbl. of oil, with 3 per cent water.

Cities Service Oil Co.'s No. 13-B Hall, SW SE NW Section 26-11-17w, Bemis pool, made maximum allowable potential of 3,000 bbl. from Arbuckle pay at 3,522-28 ft., total depth.

New work in Ellis County: Earl Wakefield's No. 3 Burnett, W½ SW NE Section 1-11-18w, location; Lario Oil & Gas Co.'s No. 5-C Cress, E½ SE SW Section 13-11-17w, rigging up rotary; Gulf Oil Corp.'s No. 4 Pearl, E½ NW SE Section 13-11-17w, rigging rotary; Dickey Oil Co.'s No. 1 Stone, C N½ NE SW Section 4-11-17w, wildcat, building rotary rig.



Midcontinent Map Co., Wichita

G. A. Fuller and associates opened a Lansing lime pool at their No. 1 Stitt, Section 21-27-1w, Sedgwick County, about 2 miles west of Wichita city limits. It pumped at the rate of 10 bbl. of oil an hour on initial test from pay at 2,797-2,806 ft., total depth

Barton County

Gulf Oil Corp.'s No. 1 Redetzke, SE NE Section 19-16-11w, Prusa district, Barton County, had Arbuckle lime at 3,333-41 ft., total depth; swabbed 102 bbl. of oil in 3½ hours; was acidized and made initial potential of 1,198 bbl. daily.

In the West Ellinwood area, Schneider & Pulse's No. 1 Ernsting, C E½ SE SW Section 6-20-11w, topped Arbuckle lime at 3,331 ft., swabbed 5 bbl. of oil an hour, was acidized and pumped 139 bbl. in 8 hours, making initial potential of 418 bbl. Total depth was 3,339 ft.

Texas Co.'s No. 1 Petz, N½ NE SE Section 7-20-11w, topped Arbuckle lime at 3,313 ft., was bottomed at 3,316 ft., swabbed 30 bbl. of oil hourly, and made potential of 3,549 bbl., calculated.

Lario Oil & Gas Co. and others' No. 3-B Zahorsky, NW SW NE Section 23-20-11w, Silica pool, had Arbuckle lime at 3,266 ft. At total depth of 3,273 ft. oil rose 2,050 ft. in 1 hour and the well flowed by heads for 3 hours. It made initial potential of 3,000 bbl., pumping, in 24 hours.

First reports in Barton County: Shell Oil Co., Inc.'s No. 9-B Bitter, SE NW SE Section 6-16-13w, waiting on cement at 657 ft.; same company's No. 10-A Hoffman, SW NW SW Section 7-16-13w, cellar; Helmerich & Payne, Inc.'s No. 7 Stettinger, N½ SW NE Section 1-16-14w, drilling at 3,267 ft.; Ohio Oil Co.'s No. 1 Brack, C N½ N½ NW Section 21-18-15w, surface hole.

Rice County

Shell Oil Co., Inc.'s No. 2-A Brothers, SW SW NW Section 31-20-7w, Wherry field, Rice County, pumped 47 bbl. of oil in 8 hours and made daily potential of 141 bbl. Production was from pay at 3,285-3,325 ft., total depth.

Gulf Oil Corp.'s No. 2 Drake, C S½ SE SW Section 31-20-7w, was dry and abandoned at total depth of 3,348 ft.

Rose & Son's No. 2 Hathaway, NW SE NW Section 34-19-10w, Silica district, found Arbuckle lime at 3,311-17 ft., total depth, pumped 34 bbl. of oil in 8 hours, and made potential of 102 bbl. daily.

Skelly Oil Co.'s No. 9-B Volkland, C E½ SE NW Section 5-18-10w, Bloomer pool, was completed in Arbuckle lime at 3,213-18 ft., total depth. Oil rose 2,800 ft. in the hole in 9 hours, it was acidized and made initial daily potential of 3,000 bbl., top allowable.

Gulf Oil Corp.'s No. 7 Stout, C N½ NE NE Section 6-18-10w, also made maximum allowable potential of 3,000 bbl. of oil daily after acid treatment. Gravity of the oil was 40.6°. Arbuckle lime was found at 3,226-35 ft., total depth.

Estimated Daily Production

Estimated daily production for Kansas for the week ended March 23, and for the preceding week was as follows:

	Barrels	
	Mar. 23	Mar. 16
Oxford City	700	700
Burrton	9,350	9,100
Ritz-Canton	4,200	4,250
Graber	3,100	3,250
Hollow-Nikkel	1,900	1,600
Lerado	950	650
Voshell	1,800	1,600
Wellington	2,050	1,850
Ellsworth County:		
Lorraine	2,050	1,700
Other pools	2,195	2,170
Rice-Barton counties:		
Bloomer	4,050	4,700
Chase	5,450	5,200
Geneseo	4,700	5,050
Raymond	500	550
Silica	14,350	15,300
Keesling	600	450
Wherry	4,550	4,500
Miscellaneous Rice	2,545	1,220
Miscellaneous Barton	10,270	9,410
Trapp district	12,800	14,500
Balance Russell County	19,750	16,350
Sedgwick County	3,500	3,400
Ellis County:		
Bemis	7,800	6,950
Miscellaneous	3,720	6,430
Kingman County	1,015	950
Stafford County	6,775	6,040
Greenwood County	7,650	7,600
El Dorado	7,250	7,300
Other fields	34,580	34,080
Total Kansas	180,150	176,750

Russell County

W. C. McBride, Inc.'s No. 6 Jellison, SE NW SW Section 19-13-14w, Atherton pool, Russell County, had Arbuckle lime at 3,254-71 ft., total depth, pumped 46 bbl. of oil in 8 hours, and made potential of 137 bbl. daily.

Texas Co.'s No. 3 Gurney, C W½ NW NE Section

23-14-14w, Gurney area, pumped 314 bbl. of oil in 8 hours from Lansing lime penetrated at 2,955-3,047 ft., total depth, and made daily potential of 942 bbl.

Coralena Oil Co.'s No. 7 Dumler, SW NW NW Section 36-15-14w, Trapp field, topped Arbuckle lime at 3,335 ft., was bottomed in that formation at 3,340 ft., pumped 935 bbl. of oil in 8 hours, and made 24-hour potential of 2,806 bbl.

Stanolind Oil & Gas Co.'s No. 8 Roesner, C N½ SW SE Section 9-15-13w, was a location. Sinclair Prairie Oil Co.'s No. 2 Sellens, NE SW SW Section 15-15-13w, set surface casing at 76 ft.

Ellsworth County

In the Edwards area Continental Oil Co. and others' No. 4 Steinberg, SW SW NW Section 27-17-8w, Ellsworth County, had Arbuckle lime at 3,179 ft., total depth 3,229 ft., and had calculated potential of 4,540 bbl., with maximum allowable of 3,000 bbl.

McPherson County

Bradley Brothers and Blair's No. 2 Mattson, C E½ NE NE Section 30-20-5w, Bornholdt pool, McPherson County, found chat pay in Mississippi horizon at 3,318-57 ft., total depth, flowed 85 bbl. of oil an hour and, after bomb-potential calculation, was completed for maximum-allowable potential of 3,000 bbl. daily.

George Bunting, Jr.'s No. 1 Zietlow, C W½ NE SE Section 18-17-1w, Roxbury pool, drilled Mississippi pay at 2,642-55 ft., total depth, was acidized, pumped 163 bbl. of oil with 14 per cent water in 8 hours and made potential of 489 bbl. of oil daily.

Cowley County

Markey & Talbott's No. 1 Anderson, C N½ NE NW Section 21-30-3e, wildcat in Cowley County, entered Mississippi lime at 3,103 ft., water intruded and it was dry and abandoned at 3,211 ft., total depth.

Hawkeye Oil Co.'s No. 1 Moneyhan, SE SW SE Section 16-31-4. Hittle pool, had nothing showing in Arbuckle lime topped at 3,369 ft., and was dry and abandoned at 3,373 ft., total depth.

New operations in Cowley County: Arthur Brewer's No. 2 Curfman, NW NE SE Section 28-31-4, drilling below 1,245 ft.; I. W. Murfin's No. 1 Jarvis, C N½ SW NE Section 19-31-5, wildcat, location; Gulf Oil Corp.'s No. 1 Denning, C N½ NW NW Section 28-32-5, rigging rotary; W. M. McKnab and Hawkeye Oil Co.'s No. 1 Sherwood, NE SE SW Section 4-35-5, rigging up.

Stafford County

Stanolind Oil & Gas Co.'s No. 6 Harbeson, C N½ N½ NW Section 11-24-11w, Zenith field, Stafford County, had pay at 3,719-79 ft., total depth, flowed 233 bbl. of oil in 3 hours, and was completed for maximum-allowable potential of 3,000 bbl. daily.

In Kingman County Skelly Oil Co.'s No. 4 Ratcliff, C SW Section 19-27-10w, was a location.

Greenwood-Marion Counties

Beaumont Oil Co. and K. T. Weidman's No. 2 Hendrickson, NW NW SE Section 25-27-8, uncovered Arbuckle lime production in the old Beaumont area, Greenwood County. Arbuckle lime was topped at 2,743 ft., total depth 2,744 ft., and it pumped 40 bbl. of oil daily.

Harwood Oil Co.'s No. 6 Novak, NW NE NW Section 28-17-4, Lost Springs pool, Marion County, found Mississippi pay at 2,380-2,414 ft., total depth, pumped 12 bbl. of oil an hour for 48 hours and was completed for an estimated 275 bbl. of oil daily.

Roy Reed and others' No. 2 Axton, C S½ NW NE Section 17-28-11, Greenwood County, was drilling below 70 ft.

In Butler County Carey & Jennings' No. 1 Kelley, SE NW SW Section 20-27-4, an old wildcat being deepened from 2,660 ft., was drilling below 2,735 ft.

Forest City Basin

ST. JOSEPH, Mo., Mar. 25.—Pawnee Royalty Co., Odessa, Tex., has started building rig again at its No. 1 Boice, C NE NE Section 18-1n-16e, discovery well near Falls City, Richardson County, Nebraska. The well, which had production in Hunton lime at 2,279-87 ft., will be deepened to Viola lime. Drilling is expected to start this week.

Phillips Petroleum Co. has been coring at its No. 1 Creston, C SE NE Section 31-71-30w, Union County, Iowa, but nothing of consequence is reported. Work was halted when band wheel broke, leaving string of tools in the hole at 2,836 ft.

In Adair County, northeastern Missouri, two wells are running structurally high on basis of previous tests. Eddington-McAlpin's No. 1 Johnson-Capps, SW SW Section 31-64-15w, topped Mississippi lime at 184 ft. and was drilling below 480 ft. Elevation is 795 ft. Eddington's No. 1 Clark, NE SE Section 8-63-14w, was drilling below 647 ft., after topping Mississippi lime at 310 ft. Its elevation is 965 ft.

Field activity is being resumed in Northwest Missouri. In Platte County, Missouri Valley Gas & Oil Co.'s No. 2 Breen, SW NE Section 7-51-33w, was dry and abandoned at 801 ft.

Same company spudded its No. 3 Brown, SE NW Section 7-51-33w, about 1,200 ft. north of No. 1 Brown, which had 2,250,000 cu. ft. of gas at 554 ft. in Peru sand. This is the company's eighth well in the area.

Carl Lebsack's No. 1 Maduska, C SE NE Section 36-8s-20, Leavenworth County, Kansas, sector of the Forest -City basin, was moving in material. Cities Service Co. is contributing to the test and has the gas rights.

Eastern Kentucky

(Continued from Page 210)

Kentucky-West Virginia Gas Co. was drilling at 350 ft., in slate, in No. 5264 on the W. H. May tract on Long Branch of Jones Fork, and is down 2,005 ft., in Maxon sand, No. 582 on the B. F. King land on Joe King Branch. The same concern had reached the 60-ft. level, in sand, in No. 584 on the Jeffie Hall land on Isaac Fork of Right Beaver.

In Henderson County, in western Kentucky, the Imperial Oil & Gas Products Co. was down 630 ft. in No. 1 on the J. R. Williams land 1¼ miles north of Zion in the Spottsville district.

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Oklahoma Operations

By
DAL DALRYMPLE

Open Oil Pool Near Wewoka; Deepening Marshall Wildcat

Major developments of the week in Oklahoma included discovery of a Wilcox sand pool in Seminole County; discovery of a new producing zone in Tillman County and completion of the biggest producer of the week in that county; completion of three producers in the Byars pool, McClain County; deeper exploration in the Marshall County discovery well, and the starting of several new wildcats.

Stanolind Oil & Gas Co.'s No. 1 Aldridge, NW NE SE Section 32-9-8, opened a pool 3½ miles north of Wewoka, Seminole County. It is about 2½ miles southeast of the Bethel pool. It flowed 420 bbl. of oil in 24 hours at total depth of 4,390 ft. Production was from Simpson dolomite and Wilcox sand. Gravity of the oil was 40.7°.

Gas production in Senora sand was developed at Mason & Nuckols' No. 1 Reed, NW NW NE Section 13-9-7, on the west flank of the Bethel field. It gaged 5,000,000 cu. ft. of gas daily in Senora sand at 2,294 ft. and was shut in for connections.

A new sector of the Frederick district, Tillman County, apparently was proven for production at Johnson Drilling Co.'s No. 1 Longacre, NE NE SE Section 32-2s-17w. About 2 months ago it found Canyon lime pay at 2,998-3,005 ft., and was estimated good for 10 bbl. of oil daily. It was shut down for several weeks, but operator recently resumed drilling and at 3,267 ft. in lime it flowed at the rate of 5 to 7 bbl. of oil an hour. The crew was reported preparing to core ahead. Location is on a Sun Oil Co. farmout, ½ mile southeast of Indian Territory Illuminating Oil Co.'s No. 1 Hatler, discovery well which was completed for a small producer after plugging back to Canyon lime at around 3,000 ft. after finding Arbuckle lime dry at 5,168 ft.

Major interest in Oklahoma operations continued to center in Pure Oil Co.'s No. 1 Quinton Little, C W½ NE SE Section 28-5s-7e, Tulip Creek sand discovery near Cumberland, Marshall County. The crews were drilling ahead below 5,475 ft. in green shale. McLish formation was cored during the past week, first McLish sand being found at 5,328-45 ft.; lime and green shale at 5,345-61 ft.; solid lime at 5,361-76 ft., with second sand at 5,376-5,407 ft. It had stains of oil and gas showing. The wildcat showed for commercial production in two sand breaks in the Tulip Creek zone, above the McLish. The well is to be drilled to contract depth in Arbuckle lime, which may be reached this week.

Work has been resumed at Johnson-Kemnitz Drilling Co. and McGraw Oil Co.'s No. 1 Godfrey-Neff, SW SE NE Section 14-6s-6e, also in Marshall County. It had been shutdown at 4,455 ft. in McLish formation, where it showed mud and water on drill-stem test. Operators were drilling ahead in hard McLish sand below 4,486 ft.

Among the Wildcats

H. L. Berkey and others' No. 1 King, C SE SW Section 2-11-6, wildcat in northeastern Pottawatomie County, found first Wilcox sand at 4,579 ft., with showings of oil in cores; topped second Wilcox sand at 4,617 ft. and was dry and abandoned at 4,630 ft., total depth.

Travis Sanders' No. 1 Buckner, NW NW SW Section 27-1n-2w, Garvin County wildcat, had a slight showing of oil at 2,030 ft. but was dry and abandoned at 3,004 ft.

Duckworth's No. 1 Bowie, NW NE SE Section 3-4-3e, was an abandoned location in northeastern Garvin County.

W. M. McKnab's No. 1 Osage, NW NE SW Section 16-29-8, wildcat in Osage County, was dry and abandoned at 2,600 ft.

Mid-Night Oil Co.'s No. 1 Howe, NW NW NE Section 20-2n-13w, old wildcat in Comanche County, was deepened from 703 ft. to 997 ft., was acadized, swabbed water with a slight showing of oil and was abandoned.

New wildcat operations: Jackson and others' No. 1 Ketchum, SW NW NW Section 6-1s-5w, northwest of the Velma pool, Stephens County, on a Darby Petroleum Co. farmout, moving in rotary tools for a 2,500-ft. test; Garr's No. 1 Walker, NE NE SE Section 5-5-5, Pottawatomie County, building rig; Margay Oil Co.'s No. 1 Reed, NW NE NE Section 12-6-6, about 1½ miles east of East Konawa pool, Seminole County, rig; Alma Oil Co.'s No. 1 Harrington, NW SE NW Section 24-9-14, Earlsboro district, Pottawatomie County, location; J. W. Meazels' No. 1 Billington, SE NE NE Section 26-9-4, on an Indian Territory Illuminating Oil Co. farmout, west of the West Earlsboro area, Pottawatomie County, set 12-in. pipe at 102 ft., waiting on cement; Potack's No. 1 Taylor, SE SE SW Section 26-10-4, Pottawatomie County, cellar and pits; F. B. Murta and others' No. 1 Ashby, C W½ NE SE Section 4-10-6, between the Keokuk and North Seminole pools, Seminole County, location; C. A. Yoakum and others' No. 1 Long, C SW SE Section 34-12-9, northwest of Okemah, Okfuskee County, spudded.

Pottawatomie County

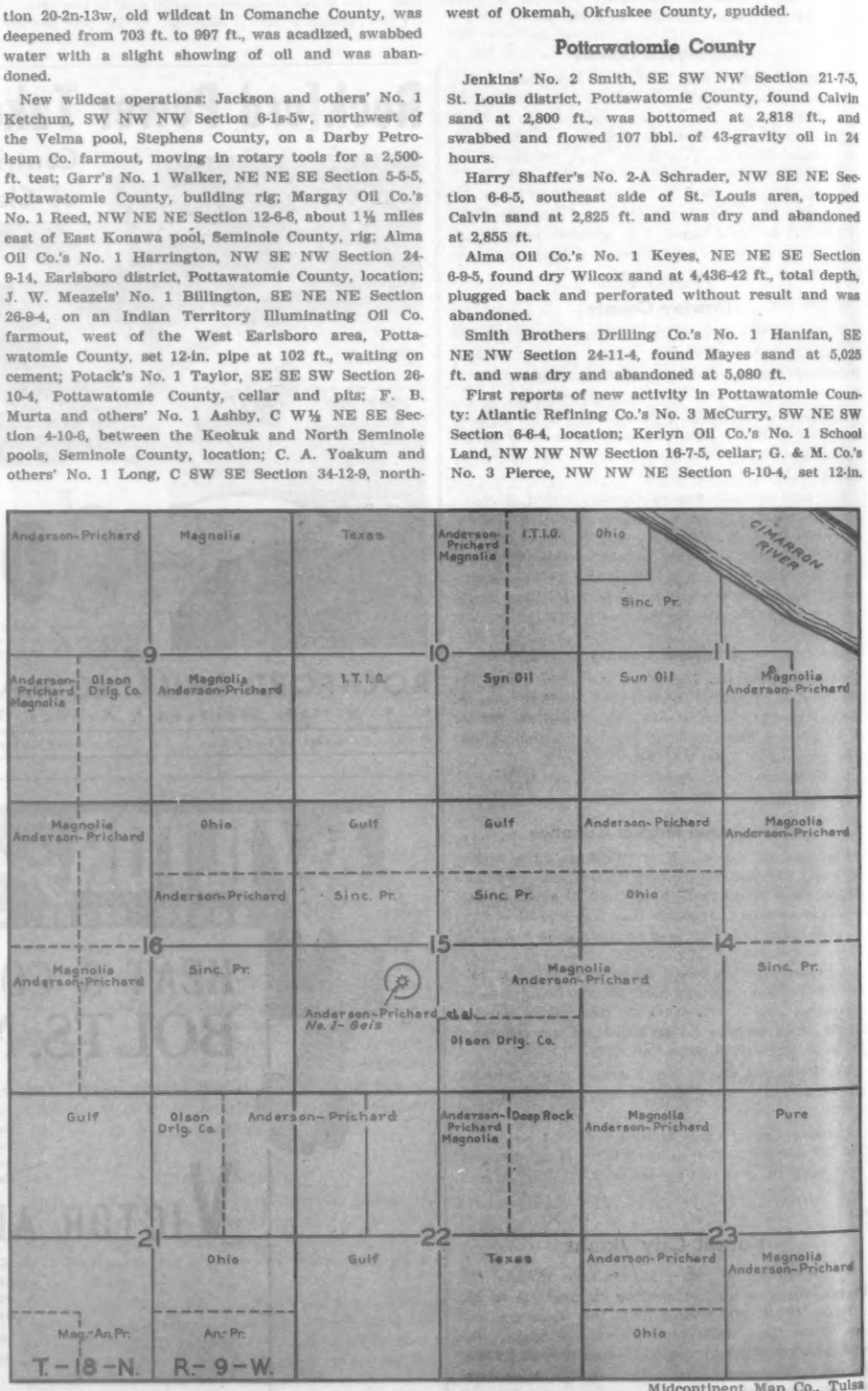
Jenkins' No. 2 Smith, SE SW NW Section 21-7-5, St. Louis district, Pottawatomie County, found Calvin sand at 2,800 ft., was bottomed at 2,818 ft., and swabbed and flowed 107 bbl. of 43-gravity oil in 24 hours.

Harry Shaffer's No. 2-A Schrader, NW SE NE Section 6-6-5, southeast side of St. Louis area, topped Calvin sand at 2,825 ft. and was dry and abandoned at 2,855 ft.

Alma Oil Co.'s No. 1 Keyes, NE NE SE Section 6-8-5, found dry Wilcox sand at 4,436-42 ft., total depth, plugged back and perforated without result and was abandoned.

Smith Brothers Drilling Co.'s No. 1 Hanifan, SE NE NW Section 24-11-4, found Mayes sand at 5,025 ft. and was dry and abandoned at 5,080 ft.

First reports of new activity in Pottawatomie County: Atlantic Refining Co.'s No. 3 McCurry, SW NE SW Section 6-6-4, location; Kerlyn Oil Co.'s No. 1 School Land, NW NW NW Section 16-7-5, cellar; G. & M. Co.'s No. 3 Pierce, NW NW NE Section 6-10-4, set 12-in.



Midcontinent Map Co., Tulsa

Anderson-Prichard Oil Corp. and others' No. 1 Geis, Section 15-18-9w, about 16 miles northwest of Kingfisher, in the county of that name, is being deepened 1,000 ft., from old total depth of 8,507 ft., with second Wilcox sand as the goal. It was completed last November as a wet-gas well through perforations at 7,333-48 ft.

pipe at 100 ft., waiting on cement; Ray Dunnett's No. 2 Rogers, SE SE SW Section 31-11-4, rig.

Seminole County

Terry's No. 3 Scroggins, NE SW NE Section 4-6-6, Dora area, Seminole County, found sand at 2,841 ft., total depth 2,866 ft., and pumped 12 bbl. of oil in 24 hours.

W. B. Pine's No. 1 Huckleberry, C E½ NW NE Section 16-6-6, topped Cromwell sand at 3,063 ft. and was dry and abandoned at 3,668 ft.

W. A. Villines' No. 3 Millsap, SE NW SW Section 23-7-5, had Earlsboro sand at 3,070 ft., was bottomed at 3,092 ft., plugged back without result and was dry and abandoned.

New work in Seminole County: McBride's No. 1 Collins, NE NW NW Section 24-5-5, old well being deepened from 2,487 ft., drilling below 2,687 ft.; Terry's No. 4 Swan, SE NW SE Section 33-7-6, location; Thompson Brothers and others' No. 1 Millsap, NE SE SE Section 33-7-6, spudded; Shepard and others' No. 4 Scroggins, SW NW SW Section 34-7-6, building rig; Burke-Greis Oil Co.'s No. 4 Henshaw, SW NE SW Section 30-8-8, drilling below 2,100 ft.

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Estimated Daily Production

Estimated daily production for Oklahoma for the week ended March 23, and for the preceding week was as follows:

	Barrels	
	Mar. 23	Mar. 16
Allen	5,875	5,850
Billings	6,375	6,450
Burbank	7,200	7,200
South Burbank	8,600	8,650
Blackwell district	3,750	3,775
Balance Osage	16,750	16,800
Bristow-Slick	6,250	6,300
Chandler	1,450	1,450
Crescent	2,300	2,350
Cromwell	2,950	2,900
Cushing-Shamrock	9,500	9,525
Duncan	3,725	3,725
Edmond	4,350	4,350
Fiah	3,425	3,450
Fitts	18,950	18,200
Jesse	2,250	2,250
Graham-Fox	2,100	2,100
Gray	775	750
Healdton	8,700	8,750
Hewitt	3,625	3,675
Keokuk	3,200	3,200
Konawa	1,225	1,250
Lucien	8,325	8,350
Moore	2,000	2,025
Oklahoma City	103,150	93,950
Olympic	2,400	2,425
Ramsey	4,050	4,200
Sasakwa	1,675	1,700
Sholem-Alechem	2,825	2,825
Seminole district:		
Bowlegs	7,500	7,525
Carr City	2,425	2,450
Dora	2,300	2,325
Earlsboro	4,500	4,525
South Earlsboro	600	625
East Earlsboro	2,250	2,250
Little River	6,800	6,750
East Little River	700	675
Maud	675	750
Mission	1,275	1,275
Seminole	7,400	7,450
East Seminole	1,175	1,200
Searight	2,375	2,350
Total Seminole	39,975	40,150
St. Louis-Pearson	32,000	32,300
Tatums	1,825	1,850
Tonkawa-Garber-Thomas	4,050	4,075
Wewoka	1,650	1,600
Yale-Jennings	3,550	3,575
Other pools	94,075	94,400
Total Oklahoma	424,875	416,375

McClain County

Patsy Oil Co.'s No. 2 Caldwell, SW NE NE Section 16-5-3, Byars pool, McClain County, topped Viola lime at 3,473 ft., was bottomed at 3,618 ft., and flowed 420 bbl. of oil through ½-in. choke in 12 hours.

Simpson-Roodhouse Drilling Co.'s No. 2 James, NW SE SE Section 9-5-3e, flowed 500 bbl. of oil in 24 hours, cutting 2 per cent. Top of Viola lime was 3,504 ft., total depth 3,660 ft.

Same operators' No. 3 James, SE SE NE Section 9-5-3, had Viola lime at 3,495 ft., was bottomed at 3,640 ft., and flowed 1,220 bbl. of oil through ½-in. choke in 16 hours.

Patsy Oil Co.'s No. 3 Richardson, SE NW SE Section 9-5-3, had dug cellar and pits.

Pontotoc County

Gulf Oil Corp.'s No. 4 Watson, NW NW NE Section 35-5-4, Bebee pool, Pontotoc County, topped dolomite at 2,560 ft., total depth 2,621 ft., was acidized and swabbed 590 bbl. of oil in 24 hours.

W. A. Delaney's No. 2 Shipley, CSL SE SW Section 21-5-8, old well in the Allen field, was deepened from 986 ft. to 1,000 ft., and recompleted for 1,500,000 cu. ft. of gas.

W. B. Pine's No. 3 Randall, SE NE NW Section 35-5-4, had dug cellar and pits. K-D & H. Co.'s No. 6 Gilmore, SW SE NE Section 29-5-8, set 5-in. casing at 870 ft., waiting on cement.

Lincoln County

Stanolind Oil & Gas Co.'s No. 3 James B, C S½ S½ SW Section 35-13-5, Wilzetta area, Lincoln County, topped Hunton lime at 4,229 ft., total depth 4,243 ft., was acidized and pumped 30 bbl. of oil and 220 bbl. of water daily.

Thornton's No. 2 Stewart, NW SE NW Section 15-13-6, Laffoon area, has second Wilcox sand at 4,246 ft., total depth 4,285 ft., was shot and pumped 185 bbl. of oil in 24 hours.

Creek County

Martin's No. 1 Hynd, SW SE SW Section 21-14-10, Creek County, topped Dutcher sand at 2,800 ft., total depth 2,823 ft., perforated casing and flowed 85 bbl. of 35-gravity oil in 24 hours.

Shaffer's No. 1-A Davidson, NW SW NW Section 30-19-8, had Red Fork sand at 2,576 ft., and was dry and abandoned at 2,605 ft.

M. P. Springer's No. 1 Havercamp, SW SE NE Section 29-14-10, was dry and abandoned at 1,798 ft.

Young's No. 1 Kimble, SE SW SW Section 21-14-10, had dug cellar and pits; Kirchner's No. 1 Baker, NW SE NE Section 20-17-9, was drilling below 1,365 ft.

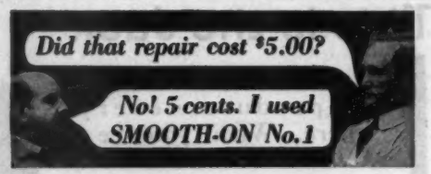
Okmulgee County

Wilson's No. 7 Crane, SW NE NW NE Section 27-14-14, Okmulgee County, was dry and abandoned at 1,752 ft.

F. Staffey's No. 3-A Lumpkins, NW NW NE NE Section 24-14-14, failed to find production and was abandoned at 1,185 ft.

Okfuskee County

Parker Drilling Co.'s No. 1-A King, NE NE SW Section 2-11-8, Dill pool, Okfuskee County, was completed for 12 bbl. of oil daily at total depth of 3,431 ft.



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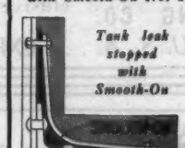

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C. L. Jordan's No. 1-A Hall, NW NW NW SE Section 21-12-11, was bottomed at 2,585 ft. and produced 10 bbl. of oil daily.

Tillman County

Indian Territory Illuminating Oil Co.'s No. 5 Dickey, NE NE NW Section 1-3s-19w, Frederick district, Tillman County, found Canyon lime at 3,100 ft., topped Arbuckle lime at 5,010 ft. and was bottomed at 5,050 ft. It flowed 1,366 bbl. of oil in 8 hours through casing and made daily potential of 4,099 bbl., to rate as the biggest producer completed the past week in Oklahoma. Gravity of the oil was 33.7°.

Pawnee County

Wood's No. 1 McCoy, NE NE SW Section 5-20-9, Pawnee County, found Prue sand at 1,810-19 ft., total depth, and produced 6,500,000 cu. ft. of gas.

Sand Springs Home's No. 1 Hemmings, SE SW SW Section 22-20-9, was shot and completed for 500,000 cu. ft. of gas in Red Fork sand at 2,021 ft., total depth 2,072 ft.

Same operators' No. 1 Dick, SW SE SE Section 21-20-9, was dry and abandoned in Wilcox sand at 2,670-71 ft., total depth.

In Osage County Foundation Oil Co.'s No. 1 Osage, NW NW SE Section 3-25-3, was dry and abandoned at 3,553 ft.

Abbott's No. 1 Sample, NE SE NE Section 35-20-8, Pawnee County, was drilling below 540 ft.

Caddo County

English Drilling Co.'s No. 3 Cobb, NW NE SW Section 11-5-9w, Cement field, Caddo County, set 7-in. casing at 3,375 ft. and was bottomed at 3,404 ft. It flowed 356 bbl. of oil in 4 hours through tubing, making 24-hour potential of 3,375 bbl.

Ray Stephens, Inc.'s No. 3 Farwell, NW SW SW Section 27-6-10w, swabbed 40 bbl. of oil in 24 hours and pumped 93 bbl. in 24 hours. Total depth was 3,570 ft., with 7-in. casing set at 3,425 ft.

Ohio Oil Co.'s No. 9 Wagner, NE SW SW Section 12-5-9w, was due for early completion. It found Rowe formation at 3,295 ft., total depth 3,403 ft., perforated casing and flowed 332 bbl. of 34.4-gravity oil through casing in 4 hours, making potential of 1,994 bbl.

Jackson County

Gulf Oil Corp.'s No. 9 Boucher, NE SE SW Section 32-1n-19w, Tipton pool, Jackson County, set 7-in. casing at 2,490 ft., total depth 2,650 ft., and pumped 89 bbl. of oil in 20 hours.

Kerbow's No. 2 Walls, SE SW NW Section 11-1n-20w, Altus field, pumped 16 bbl. of oil daily after drilling to 1,694 ft. and setting 7-in. pipe at 1,350 ft.

R. O. Ray's No. 1 Mathis, SE SW SE Section 32-1n-19w, was dry and abandoned at 2,762 ft., total depth, in shale.

Harper and others' No. 1 Ronald, SW NE NW Section 5-1s-19w, was dry and abandoned at 2,700 ft.

Kerbow's No. 1 Alexander, NE NE SE Section 10-1n-20w, was drilling below 1,323 ft. Navajo Oil Co.'s No. 6 Hansley, NE SW NW Section 10-1n-20w, set 7-in. pipe at 1,385 ft., total depth, and was waiting on cement.

Kiowa County

Fields' No. 5 Oster, NW SW SW Section 27-7-17w, Kiowa County, was estimated good for 750,000 cu. ft. of sour gas, but was abandoned at 809 ft., total depth.

In Comanche County Wichita Oils, Inc.'s No. 15 Palmer, SW SW NE NW Section 28-2n-10w, was completed for 5 bbl. of oil daily at total depth of 465 ft.

In Grady County W. Critchlow's No. 7 Adair, C W½ W½ SW NW Section 27-3n-5w, Knox pool, was completed for an estimated 240 bbl. of oil daily.

Carter County

Daube's No. 1 Love, SW NW NW Section 33-1s-3w, Sholem-Alechem pool, Carter County, was bottomed at 4,007 ft., with 7-in. casing set at 3,639 ft. It swabbed 107 bbl. of oil in 24 hours, and pumped the same amount through casing in 24 hours.

Shell Oil Co.'s No. 45 Ward, SW NW NE NW Section 6-4s-3w, was dry and abandoned at 1,270 ft., total depth.

Same company's No. 45 Tubbee, C W½ SE SW NW Section 24-4s-3w, was completed for 10 bbl. of oil daily at total depth of 1,634 ft.

Wagoner County

Elmer Rule's No. 1 Aetna, C N½ N½ NE NE Section 34-18-17, Wagoner County, produced 490,000 cu. ft. of gas at 302 ft., total depth.

Laurence Price's No. 1 fee, C NE NE Section 31-17-18, and M. J. Martin's No. 6 Walcott, SE NW NW Section 36-18-15, were locations.

New Operations

Southern's No. 1 Diamond, C W½ NE SE Section 33-9-9, Hughes County, was a location.

Wells' No. 1 Powell B, NW SW NW Section 30-10-12, Okfuskee County, was a location.

Blackwell Oil & Gas Co.'s No. 2 Shannon, NE SE SW Section 24-18-4, Payne County, was a location. In the same county Gulf Oil Corp.'s No. 2 Running Fox, NE SE NE Section 5-19-5, was drilling below 100 ft.

Woodworth's No. 1 Herell, NW NE SW Section 20-4s-2w, Carter County, was rigging up rotary tools.

R. O. Deulen and others' No. 1 fee, C NW NW Section 28-26-20, Craig County, was a location.

Western Kentucky

(Continued from Page 210)

Livingston County, 2½ miles east of Smithland: J. H. Dunn's No. 1 H. L. Dunn, dry hole at 2,504 ft.

McLean County, Island district: South Penn Oil Co.'s No. 9 H. K. and John Kirtley, rigging up.

Ohio County, Pattyville district: Eureka Oil & Gas Co.'s No. 4 W. H. Davidson, rigging up. Fordsville district: W. E. Hupp and others' No. 1 Dr. Miller, moving in. Henry Scholl's No. 5 Roy Muffett, drilling at 350 ft. Sunnydale district: J. Hunt and others' No. 2 Charles Russell, dry hole at 477 ft. Tuttle & Russell's No. 4 C. E. Wimsatt, rigging up. Buford district: L. E. Owen and E. Border's No. 5 G. C. Whittaker, location.

Todd County, 7 miles north of Elkton: E. D. Noe and Myers' No. 1 Harris, location for a Devonian test.

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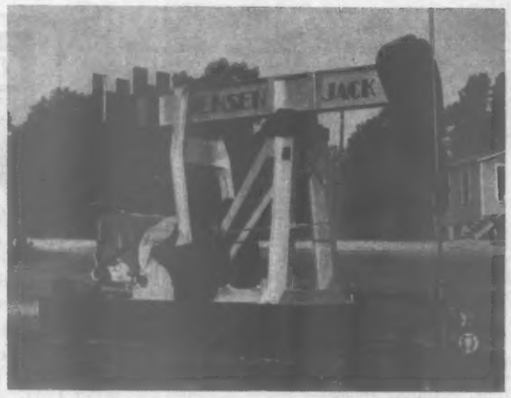

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THE OIL AND GAS JOURNAL

North Louisiana, Arkansas

By GEORGE WEBER

Haynesville Field Will Be Given Its First Deep Test

SHREVEPORT, La., Mar. 25.—Progress in the district's outstanding wildcat test, in Miller County, Arkansas, and the beginning of deep drilling in the Haynesville area of Claiborne Parish, North Louisiana, marked the week's most important developments in the tri-state section.

Active and projected wildcatting in several other sections of Arkansas and North Louisiana also gained attention. Increased activity is seen in the Atlanta field of Columbia County, Arkansas, with Magnolia approaching completion of drilling and Dorcheat shut in pending pressure tests.

Production by Pool

Estimated daily gross production, all companies, week ended March 22:

NORTH LOUISIANA

	Bbl.
Bellevue	485
Caddo, light	5,185
Caddo, heavy	2,160
Converse	565
Cotton Valley	*14,505
Cross Lake	4,680
De Soto and Red River	970
Elm Grove	280
Haynesville	2,740
Holly	55
Homer	2,730
Lisbon	5,010
Pleasant Hill	105
Rodessa	21,830
Sarepta-Carterville	†330
Sligo	2,100
Sugar Creek	570
Urania	2,085
Zwolle	2,035
Total North Louisiana	68,420

SOUTH ARKANSAS

Atlanta	960
Big Creek	closed in
Buckner	2,115
Champagnolle	1,230
Dorcheat	1,360
El Dorado	1,635
Lewisville	705
Lisbon	210
Magnolia	19,880
Miller County	270
Nevada	555
Nick Springs	155
Rodessa	2,145
Schuler	18,725
Smackover, light	1,730
Smackover, heavy	13,580
Stephens	525
Troy	1,340
Urbana	905
Village	1,220
Total South Arkansas	69,245

*4,270 bbl. is distillate. †90 bbl. is distillate. Texas side of Rodessa 23,975 bbl.

Fouke Test

Standard Oil Co.'s No. 1 Sturgis, C NW SE Section 1-17-27, near Fouke, in Miller County, was coring below 5,280 ft. at the week end following an unsuccessful drill-stem test in a porous oolitic lime section cored at 5,219-37 ft. The section cored showed possibilities of oil production, but the drill-stem test recovered salt water. Operators are coring deeper for further possibilities in the Rodessa member of the lower Glen Rose formation, and possibly will go as deep as the Smackover lime.

The wildcat is considered a field discovery in the Paluxy formation, having tested oil and gas, but no water, in a saturated section last week at 3,585-3,600 ft. A show of oil was also found in the Blossom sand. In case nothing further is found in the deeper horizons, the wildcat will be plugged back and completed in the Paluxy. Already the Arkansas Oil and Gas Commission has issued tentative field rules for the new pool, allocating 20-acre spacing.

In the Atlanta field of Columbia County Tide Water and Seaboard are reported completing No. 2 J. T. Beene after some difficulty in making the well flow. It is on the north edge of production and further shows that edge as essentially defined, following the same difficulty with which Hassie Hunt's No. 2 McWilliams has met. Increased drilling is expected in the field.

Southeast of Village, in Columbia County, James Forgotson's No. 1 L. M. Dendy, a wildcat projected to the Smackover lime, is drilling below 5,745 ft. To the east in Union County, Fohs Oil Co. and Barnsdall Oil Corp. are beginning operations in the Nick Springs area, recently proven productive by Delta Drilling Co. and others.

North Louisiana

The Haynesville field of Claiborne Parish, Louisiana, is due for its long awaited deep exploration. Last week two tests were staked in the area. Tiki Exploration Co.'s No. 1 J. L. Moss, NE SE Section 11-22-8, is moving in material for a lower Glen Rose test about 3 miles southwest of Haynesville. In addition, a deep test, possibly to go 10,000 ft. is being planned as a joint operation by Ohio Oil Co. and Gulf Refining Co. This test has been long scheduled and was due to have been started late last year. Haynesville remains as one of the important shallow fields in North Louisiana in which deeper possibilities have not been explored, and the tests will be watched with considerable interest.

In La Salle Parish two offset wildcats east of the Urania field showed no important developments during the week. The deep test, Hunt Oil Co. and Arkansas Fuel Oil Co.'s No. 1 Goodpine was plugged back from its old total depth of 8,997 ft. to 4,863 ft. where a string of 5½-in. casing was set. The other test, Placid Oil Co.'s No. 9 Louisiana Central Lumber Co. is awaiting another tests after showing gas and salt water at 2,401 ft.

NORTH LOUISIANA COMPLETIONS

Caddo—Caddo Parish

H. J. Strief's No. 3 Noel estate, Section 12-20-16, 325 bbl., total depth 1,541 ft. Magnolia Petroleum Co.'s No. 31 Dillon, Section 23-21-15, 50 bbl., total depth 1,665 ft. J. Ray Murray's No. 1 Chesire, Section 32-21-15, 50 bbl., total depth 1,592 ft. W. & W. Oil Co.'s No. 4 Arkansas Fuel Oil Co., Section 12-20-16, 225 bbl., total depth 1,546 ft.

ARKANSAS COMPLETIONS

Magnolia—Columbia County

Atlantic Refining Co.'s No. 1 J. J. Gunnels, 570 ft. west and 574 ft. south of NE cor. SW SW Section 19-17-19, 408 bbl., ¼-in. choke, tubing pressure 925 lb., casing pressure 1,200 lb., set 7-in. casing 7,573 ft.

GEORGIA

The test being drilled in the Cumberland Plateau section, 1 mile south of Trenton, county seat of Dade County, Georgia, is being drilled and operated by Hoosier Drilling Co., of Owensboro, Ky., and not by Ky-Mo Oil Co. as reported in the March 14 issue of The Oil and Gas Journal. The drilling contractor employed by Hoosier Drilling Co. is J. A. Barrett of Owensboro. The test is reported drilling at 1,050 ft. and is scheduled to test the Knox dolomite at approximately 2,000 ft.

EAST TEXAS BORDER COMPLETIONS

Caddo—Marion County

R. S. Barnwell's No. 1 Fitzgerald, N. Guyton Survey, pumping 4 bbl., oil sand 2,372-83 ft., total depth 2,415 ft. R. W. Cosby's No. 1 Stiles, J. G. Reeves Survey, pumping 6 bbl., set 7-in. casing at 2,206 ft., total depth 2,406 ft.

Smithland—Marion County

L. Lindsay's No. 1 Hart, G. Coore Survey, pumping 116 bbl., total depth 2,325 ft., set 5½-in. casing at 2,264 ft. H. T. Manning's No. 2 T. O. Livingston, G. Coore Survey, pumping 50 bbl., total depth 2,330 ft., set 6⅝-in. casing at 2,311 ft.

Indiana Fields

(Continued from Page 210)

Posey County

In Posey County Kelley and others' No. 1 Hahn, SE SW NW Section 1-7s-12w, was below 1,823 ft., and drilling. Nash, Redwine and others were rigging up rotary for No. 1 Woods Community Unit, C NE SW SW Section 1-7s-12w. Nash, Redwine and others made a location for No. 1 Reis, SW SW NE Section 1-7s-12w. Joe Minton and others' No. 1 Hill, NW SE NW Section 7-4s-13w, which was drilled to 3,013 ft., and then plugged back, had 5½-in. casing set at 2,569 ft.

McBride & Shirley and others' No. 1 Keck, SW cor. NE NE NW Section 34-3s-14w, total depth 2,156 ft., was rigging up standard tools. Roberts Brothers' No. 3 Keck, C E½ NW NW Section 34-3s-14w, had 500 ft. of oil in the hole at a total depth of 2,803 ft. and was being rigged up to pump. Somers & Egan's No. 3 Keck, SW NE NW Section 34-3s-14w, was shot with 10 qt. at 2,131-41 ft. and with 10 qt. at 2,148-58 ft., and the crew was cleaning out. J. D. Wrather and others' No. 1 Keck, NE NE NW Section 34-3s-14w, was shot with 20 qt. at 2,782-2,800 ft., and flowed 172 bbl. in 5 hours. The crew was testing.

Spencer County

In Spencer County Snell and others' No. 1 Biggerstaff, SW SW SE Section 6-7s-7w, made a small well. It had pay at 1,051-56 ft. which was shot with 30 qt. It pumped 5 bbl. of oil and 25 bbl. of water per day.

Kentucky Natural Gas Co. was drilling at 688 ft. in No. 1 Scamahorn, C NE NW Section 29-7s-6w. Damron, Gulf Refining Co. and others were below 250 ft. in No. 1 Miller-Axton, C W½ NE SE Section 30-7s-6w. Kentucky Natural Gas Co. was rigging up standard tools at No. 1 Hall Community, C SE SW Section 29-7s-6w. Sturbois and others' No. 2 Boyd, SW NE NE Section 31-7s-6w, was drilling at 275 ft. Snell and others' No. 1 Crowder, NW cor. SW NW Section 7-7s-7w, was at a total depth of 975 ft., underreaming 6-in. casing. Damron Brothers spudded No. 1 Frank, C SE NE SE Section 35-7s-7w. Troy Refining Co.'s No. 4 Anderson, NW SE NE Section 11-6s-4w, was shot with 30 qt. at 799-806 ft. The pipe collapsed and the crew was fishing. Ohio Oil Co.'s No. 1 Holtzman, NE SE SE Section 28-4s-4w, was shot down at 1,647 ft. to make repairs. St. Louis lime was topped at 1,005 ft. and Salem lime at 1,230 ft. It had no showing of oil.

Dubois County

In Dubois County Damron Brothers' No. 4 Humbert, C N½ SW SW Section 25-1s-4w, had a small showing of oil in sand at 637-42 ft. and was drilled to 690 ft. where it was abandoned as dry. Indiana Illinois Producing Corp.'s No. 1 Schipp, NE NE SE Section 1-3s-5w, Dubois County, was drilling at 760 ft.

In Pike County Newton Pipe Line Co.'s No. 1 Crow, C NE NE Section 24-1n-9w, had a hole full of water at 1,304-15 ft. and was drilling at 2,384 ft. Golconda lime was topped at 1,152 ft.

North Cowden Is Extended By Another Connecting Link

By D. H. STORMONT

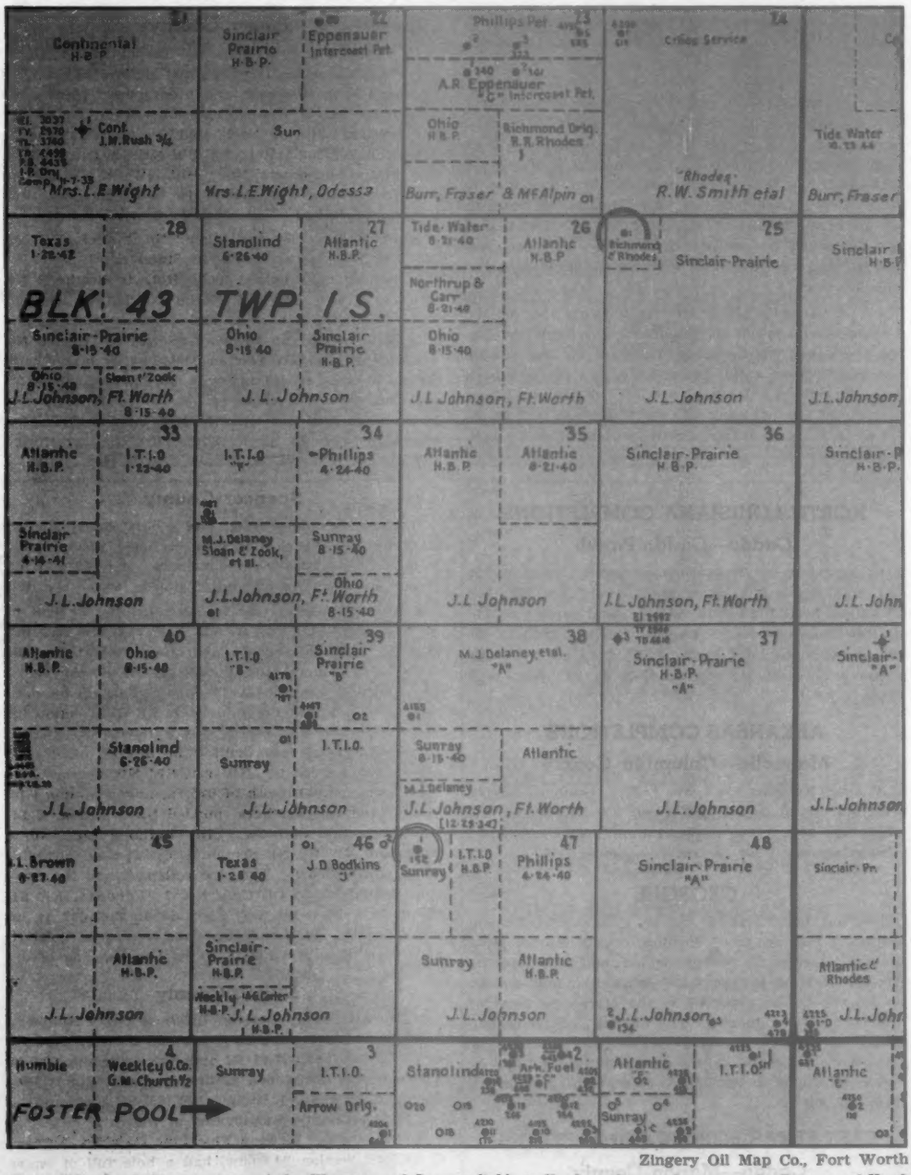
MIDLAND, Tex., Mar. 25.—A ½-mile-south extension for the North Cowden field which tends to further run that area down into the Johnson link area and southward to the Foster field, featured the developments of the week in the West Texas district.

Operations in the several square miles between the Foster and the North Cowden fields have practically linked these major West Texas producing areas into one large field. Not unlike the linking process seen last year for the Wasson and the Bennett fields, edge tests have gradually narrowed the intervening gap between the fields.

The newest producer and one of the major wells in the linking process is Ray R. Rhodes, Joe D. Tompkins, and Richmond Drilling Co.'s No. 1 J. Lee Johnson, NW NW Section 25, Block 43, Township 1s, T.&P. Survey. The hole is bottomed at 4,145 ft., the first showings of oil having been found at 4,085 ft. At 4,135 ft. oil rose 3,000 ft. in the hole. As the week closed the well had been shut in to erect storage preparatory to the official gage this week. The completion of this well will take another active test away from the deep Holt lime development, it having been contracted to the 5,200-ft. level should production have failed in the North Cowden field pay level.

Another new completion in the link area is Sinclair Prairie Oil Co.'s No. 1 Marcus Gist, Section 44, Block 42, Township 1s, T.&P. Survey, ½ mile north of the east side of the Foster field. The well was completed for an official gage of 523 bbl. of oil in 22 hours after it was shot in the pay section from 4,142 to 4,284 ft., total depth.

Extending the Johnson link itself ½ mile to the west, Jack D. Bodkins, of Midland, reported the completion of his No. 1-J Johnson, Section 46, Block 43, Township 1s, T.&P. Survey. The well made 767 bbl. of oil in 24 hours from pay shot with 400 qt. from 4,044 to 4,144 ft., 4 feet off bottom.



Zingery Oil Map Co., Fort Worth

Not unlike the linking process of the Wasson and Bennett fields in Yoakum County last year, the Foster and North Cowden fields of Ector County are now generally considered to be on one large structure

Crockett County

Possibility of production from the Strawn series of lower Pennsylvanian in Crockett County was seen as the week closed at Continental Oil Co.'s No. 2-B Todd unit, Section 29, Block WX, G.C.&S.F. Survey, Ordovician-projected wildcat test about 15 miles northwest of Ozona. No. 2-B Todd, about ⅞ mile northwest of the same company's No. 1-B Todd, deep failure at 7,010 ft., is bottomed at 5,690 ft. in crinoidal lime of Strawn age and preparations are being made to run tubing and test. It is estimated that the soft-lime formation was drilled at the rate of a foot per minute. Broken shows of oil were found in the lime from 5,634 ft. to total depth given.

Crane County

Location for a wildcat test in eastern Crane County, about midway between the Dune and the Waddell fields, was announced at the close of the week by Gulf Oil Corp. It staked No. 31 Waddell, 990 ft. from the south and east lines of NW Section 5, Block 24-B, P.S.L. Survey. The location is 3½ miles north and slightly west of the Dune field, 4 miles southeast of two small Magnolia Petroleum Co. producers on the southeast edge of the Waddell field, and on the large Gulf holdings in the Waddell ranch. It is projected to the regular McKnight pay zone at 3,600 ft., but if the section proves barren it is understood it will be carried deeper as an exploratory hole.

WEST TEXAS FIELD COMPLETIONS

(24-hour gages)

Andrews County

Means field: Humble Oil & Refining Co.'s No. 76 J. S. Means, 4,460-4,515 ft., 776 bbl.

Crane County

McElroy field: Gulf Oil Corp.'s No. 7-A Crier-McElroy, 2,704-2,908 ft., 513 bbl.

Crockett County

Crockett field: Frank B. Black's No. 9-B Powell, 2,614-42 ft., 812 bbl.

Ector County

Foster field: Arrow Drilling Co.'s No. 11 H. C. Foster, 4,120-4,300 ft., 1,366 bbl. Atlantic Refining Co.'s No. 8 Henderson, 4,010-4,350 ft., 1,422 bbl. Sinclair Prairie Oil Co.'s No. 1 Marcus Gist, 4,143-4,290 ft., 600 bbl. Stanolind Oil & Gas Co.'s No. 35-A E. F. Cowden, 4,035-4,200 ft., 464 bbl. Stanolind Oil & Gas Co.'s No. 17 Johnson, 4,195-4,260 ft., 116 bbl. Stanolind Oil & Gas Co.'s No. 39 Witcher, 3,935-4,170 ft., 1,224 bbl. Stanolind Oil & Gas Co.'s No. 40 Witcher, 3,935-4,180 ft., 1,903 bbl.

Goldsmith field: Gulf Oil Corp.'s No. 256 Goldsmith, 4,181-4,236 ft., 848 bbl. Gulf Oil Corp.'s No. 258 Goldsmith, 4,110-80 ft., 1,068 bbl. Gulf Oil Corp.'s No. 259 Goldsmith, 4,162-4,227 ft., 1,692 bbl.

North Cowden field: Barnsdall Oil Co.'s No. 6 Smith, 4,105-90 ft., 1,469 bbl.

Jordan field: Atlantic Refining Co.'s No. 7-D University, 3,440-3,660 ft., 1,086 bbl. Shell Oil Co., Inc.'s No. 7-E University, 3,375-3,650 ft., 1,268 bbl.

Gaines County

Wasson field: Continental Oil Co.'s No. 3-50 Wasson, 4,905-5,027 ft., 1,159 bbl. Magnolia and Atlantic's No. 2-265 H.&J., 5,070-5,301 ft., 802 bbl.

Seminole field: Osage Drilling Co.'s No. 6-A Tippett, 5,115-5,327 ft., 856 bbl.

Hockley County

Slaughter field: Stanolind Oil & Gas Co.'s No. 7-B Slaughter, 4,930-5,010 ft., 618 bbl.

Scurry County

Sharon field: Buffington & Smith's No. 1-A B. H. Chapman, 1,688-1,743 ft., 40 bbl. F. W. Merrick, Inc.'s No. 1 First National Bank of Snyder, 2,250-2,539 ft., 127 bbl.

Tom Green County

A wildcat, Spinner Oil Co.'s No. 1 Reed, top San Angelo 535 ft., base San Angelo 665 ft., top Wichita 740 ft., top Cisco 2,530 ft., dry and abandoned at total depth of 5,803 ft.

Upton County

McElroy field: Gulf Oil Corp.'s No. 39 Crier-McElroy, 2,600-2,815 ft., 3,721 bbl. Texas Pacific Coal & Oil Co.'s No. 4-B Sherk, 2,654-72 ft., 166 bbl.

Ward County

Estes field: Gulf Oil Corp.'s No. 121 O'Brien, 2,575-2,650 ft., 110 bbl. Gulf Oil Corp.'s No. 123 O'Brien, 2,581-2,787 ft., 228 bbl. Gulf Oil Corp.'s No. 124 O'Brien, 2,580-2,767 ft., 240 bbl.

Sealy field: Navarro Oil Co.'s No. 1 Sealy, 3,068-3,072 ft., 891 bbl.

Winkler County

Atlantic Refining Co.'s No. 8-C Hess, 2,996-3,070 ft., 1,520 bbl. Stanolind Oil & Gas Co.-Westbrook's No. T-88-G-X-5 Hendrick, abandoned location.

Yoakum County

Wasson field: Aloco Oil Co.'s No. 4 Hill, 4,965-5,214 ft., 778 bbl. Aloco Oil Co.'s No. 2 W. O. Moore, 4,976-5,242 ft., 172 bbl. Aloco Oil Co.'s No. 5 White, 4,976-5,220 ft., 728 bbl. Anderson-Prichard Oil Corp.'s No. 2-805 Spearman-Willard, 4,930-5,136 ft., 1,026 bbl. Continental Oil Co.'s No. 2,867 Kendrick, 4,985-5,124 ft., 624 bbl. Honolulu Oil Corp.'s No. 6-804 Wilder, 4,960-5,155 ft., 942 bbl. Honolulu Oil Corp.'s No. 8-824 Wilder, 4,990-5,162 ft., 752 bbl. Honolulu Oil Corp.'s No. 3-761 Willard, 4,980-5,180 ft., 974 bbl. Humble Oil & Refining Co.'s No. 2 Bennett, 5,000-5,198 ft., 582 bbl. Mabee Oil & Gas Co.'s No. 3-C Willard, 4,950-5,191 ft., 1,171 bbl. Magnolia Petroleum Co.'s No. 10 Mashoney, 4,942-5,195 ft., 941 bbl. Mid-Continent Petroleum Corp.'s No. 4 Comer, 5,020-5,180 ft., 1,717 bbl. J. W. Murchison's No. 1-B C. S. Anderson, 4,950-5,180 ft., 357 bbl. Oil Development Co.'s No. 10-803 fee, 4,900-5,215 ft., 1,678 bbl. Oil Development Co.'s No. 12-803 fee, 4,913-5,210 ft., 2,142 bbl.

WEST CENTRAL TEXAS

FORT WORTH, Tex., Mar. 25.—A considerable decline in both field and wildcat development marked the past week's activity in the West Central Texas district. Only one wildcat location was staked. Ten oil wells, one gas well and seven dry holes were completed.

The wildcat location was a previously announced intention to drill. It is in Stephens County and is Jones Brothers Drilling Co.'s No. 1 TXL, C SE SE Section 3, Block 3, S.P. Survey. Contract depth is 4,050 ft. and the location is slightly north of the area opened to production by George E. Fagg.

The majority of West Central Texas' active wildcat tests are drilling ahead with little change over the past week. Two miles south of the Steffens field in southeastern Jones County, Merry Brothers and Perini were drilling ahead toward the Hope lime at about 1,850 ft. after finding both the Bluff Creek and Flippen sands barren. The test is No. 1 S. L. Hodges, NW cor. S½ A. Bell Survey, Abstract 6.

A closely watched wildcat just northwest of the Sandy Ridge field, also in the southeastern part of Jones County, S. B. Robert's No. 1-A Jeffries, Section 7, Block 15, T.&P. Survey, was abandoned as dry at a total depth of 3,665 ft. Production was indicated at several levels in the test, the deepest being in the Palo Pinto lime.

WEST CENTRAL TEXAS COMPLETIONS

(24-hour gages)

Brown County

Cross Cut field: Danube Oil Co.'s No. 1 Keller, 1,132-38 ft., 15 bbl. G. Greynolds' No. 2 Howell, 1,197-1,209 ft., 18 bbl.

Callahan County

Putnam field: R. Wilbank's No. 1 fee, 315-23 ft., 9 bbl. Valley Osage Oil Co.'s No. 6 Slaughter, 370-72 ft., 1,000,000 cu. ft. of gas.

Baird field: R. Hickman's No. 1 Hickman, dry and abandoned at 1,308 ft.

Hatchett field: E. Johnson's No. 5 Higgins, dry and abandoned at 477 ft.

Coleman County

Novice field: States Oil Corp.'s No. 1 Sewell, 3,586-3,622 ft., 47 bbl.

Comanche County

Sipe Spring field: Shallow Oil Co., Inc.'s No. 2 Jones, 415-21 ft., 3 bbl. Shallow Oil Co., Inc.'s No. 3 Jones, dry and abandoned at 425 ft.

Amity field: L. H. Choate's No. 3 Ayers, 572-82 ft., 21 bbl.

Erath County

A wildcat, T. Gray's No. 1 Young, abandoned location.

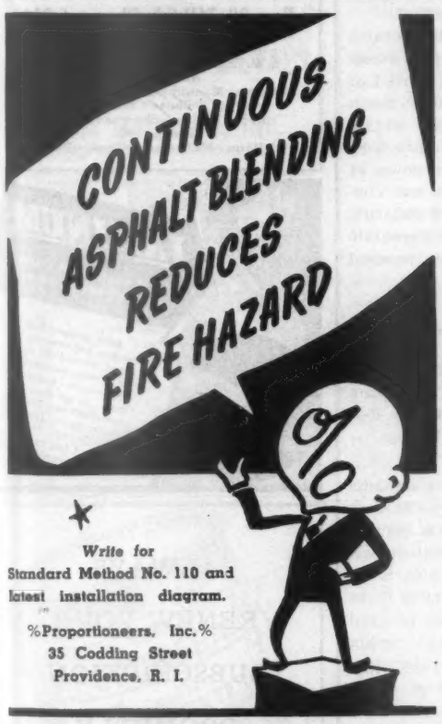
Jones County

Lewis field: Danciger Oil & Refining Co., Inc.'s No. 8 Roberts, 1,905-18 ft., 274 bbl.

A wildcat, S. B. Robert's No. 1-A Jeffries, Section 7, Block 15, T.&P. Survey, dry and abandoned at 3,665 ft.

Noodle Creek field: Humble Oil & Refining Co.'s No. 7 Irwin, dry and abandoned at 3,040 ft.

(Continued on Page 232)



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Among the Drilling

ALLEN & MORRIS received contract for two wells the past week. One rig is being moved to the West Ranch field, Jackson County, Texas, for American Liberty Oil Co.'s No. 1 Ward, while in Nueces County, W.R.R. Oil Co.'s No. 1 State is preparing to spud. Another operation is reported in the La Rosa field, Refugio County, for Coronado Oil Corp.

CARLTON DRILLING CO. has started a wildcat operation north of the Humble field in Harris County, Texas. The well is being drilled jointly with C. B. Bunte and others, and is located on the Bender lease in the J. W. Singleton Survey.

ROWAN DRILLING CO. is drilling below 4,000 ft. on the company's joint wildcat located in the Cedar Bayou area, Harris County, Texas. Another operation is reported at the Venice field, Plaquemines Parish, coastal Louisiana, for Tide Water Associated Oil Co.

GEORGE ECHOLS opened a new field in Liberty County, Texas, with the completion of No. 1 E. W. Boyt. The well was drilled jointly with the Titanic Oil Co. and Hebert & Smith. Two other rotaries are located in the South China field, Jefferson County, for Titanic, while at League City, Galveston County, one rig is running for Phillips Petroleum Co.

CROSBY DRILLING CO. is testing Strake Petroleum Co.'s No. 1 Winnie Poole located in the Lissie area, Wharton County, Texas. The well is testing the Wilcox sand at intervals from 9,950-10,050 ft. One rig is operating at the Bayou Blue field, Iberville Parish, Louisiana, while drilling operations were started on the company's test at the Bancroft field in Beauregard Parish.

FRANK GRAVIS is moving a rig 1½ miles north of the Alice field, Jim Wells County, Texas, for No. 1 Forry in the Jose Maria Garcia Survey.

CHRISTIAN-CARPENTER DRILLing Co. is coring for the pay in Rodgers & Hewitt's No. 1 Dougherty, a north outpost test in the Fairbanks field, Harris County, Texas.

EMORY CARPER, Artesia, N. M., drilling contractor, has started work at Carper, Tallmadge & Miles' No. 3 State, Section 32-17s-30e, in the Loco Hills extension area, Eddy County, New Mexico. Governor Miles of New Mexico has an interest in this test and two producing wells in the same section. The Artesia contractor also is drilling Tallmadge & Cowell's No. 1 State, Section 16-18-29, in the Loco Hills field.

ELMER J. FISHER, Albuquerque, N. M., drilling contractor, was scheduled to resume drilling by April 1 at Norins Realty Co., Inc.'s No. 2 North Albuquerque Acres, Section 19-11n-4e, wildcat in Bernalillo County, New Mexico. It had been shut down at 4,710 ft. Mr. Fisher also has contract to drill Norins' No. 2 Pajarito, Section 22-9n-1e, another Bernalillo County wildcat which has reached the 2,000-ft. level.

CLOYD PECHIN, Wichita, Kans., has the contract to drill F. O. Barker's No. 1 Thompson, NE NW SW Section 2-24-3e, in the Thompson pool, about 5 miles north of the Potwin field, Butler County, Kansas.

FAIN DRILLING CO., Oklahoma City, Okla., drilled Sunray Oil Co.'s No. 1 McMinn, CWL NW NW Section 14-29-2w, prospective wildcat discovery well southwest of Wichita, Sedgwick County, Kansas, to 4,055 ft. in dry Arbuckle lime. It was plugged back and plug set in 5½-in. casing at 3,570 ft. to test saturated pay cored in Mississippi lime at 3,570-90 ft.

W. T. SHELTON, Ada, Okla., was due to complete his No. 1 Woods, NE SE Section 33-7-6, Dora pool, Seminole County, Oklahoma, which was reported showing for 50 bbl. of oil an hour in Earlsboro sand at 2,796-2,888 ft. The operator's associates in Dora pool operations did not enthuse over the location, so he bought a string of tools and acted as his own contractor. He has chartered the W. T. Shelton Drilling Co., of Ada., with $10,000 capital. Other firm members of the new drilling company are R. H. Shelton and T. O. Dandridge, also of Ada.

JOHNNY HALCO has contracted to drill a wildcat west of the Earlsboro district, Pottawatomie County, Oklahoma, at J. W. Meazel's No. 1 Billington, Section 26-9-4, on an Indian Territory Illuminating Oil Co. farmout.

HARRY HARPER and Ferndale Drilling Co., Odessa, Tex., was moving equipment from Pawnee Royalty Co.'s second test drilled in the Falls City, Neb., district, which was a failure, to the No. 1 Boice, first Ne-

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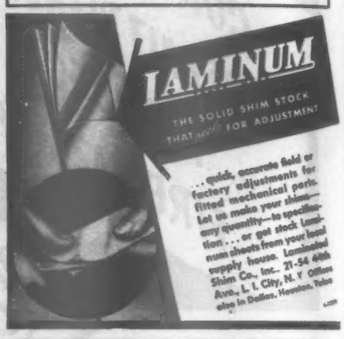
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braska discovery well, which found oil in Hunton lime. The contractor will attempt to cement off the Hunton and deepen to Viola lime, where a better pay zone is expected.

GROOVER & ROSE, drilling contractors and independent operators of Albany, Tex., together with Jones & Stasney, also of Albany, have announced location for a wildcat test to the Palo Pinto lime a mile north of the Griffin pool in Jones County, West Central Texas. Location is 467 ft. from the south and east lines of SW Section 192, B.B.B.&C. Survey, the test being No. 1 B. C. Humphrey. Groover & Rose will spud in this week and will drill to the contract depth with cable tools.

UNGREN & FRAZIER, Abilene, Tex., are drilling below 1,792 ft. at a wildcat a mile east of the Lewis-Steffens field of eastern Jones County, West Central Texas. It is being drilled for Merry Brothers & Perini, Abilene, and is No. 1 S. L. Hodges, located in the SW S½ A. Bell Survey No. 6. Both the Bluff Creek sand and the Flippen lime sections were reported barren and the test is proceeding to the Hope lime horizon.

FRANK L. SHACKELFORD, Dallas, Tex., independent operator, using his own tools, will drill a wildcat test to the Woodbine sand in northern Van Zandt County, eastern Texas. It will be the operator's No. 1 J. R. Oliver, located on the west 50 acres of a 198-acre lease on the extreme east side of the John Wright league. Location is on a block of approximately 4,000 acres assembled by D. C. Gibson and Robert Scott, both of Grand Saline, and turned to Shackelford for drilling. Contract depth is 4,500 ft. or through the lower Woodbine. The wildcat is about 3 miles northwest of Grand Saline.

RICHARDS & HOLLOWAY, INC., Tyler, Tex., has been let the drilling contract for a new wildcat test in Kaufman County, eastern Texas. It will be drilled for P. S. Groginske of Fort Worth and Ward Gannon of Dallas and will be their No. 1 Eli H. Brown, Jr. Location is in a 902-acre tract in the M. Reynolds Survey, about 4 miles west and north of Kemp. It is on a block of about 4,000 acres and is contracted to the Woodbine sand.

JOHNSON-KEMNITZ DRILLING Co., Oklahoma City, has resumed work at No. 1 Neff-Godfrey, Section 14-6s-6e, Marshall County, Oklahoma, wildcat which is a joint operation with McGraw Oil Co., Tulsa. It had been shut down at 4,455 ft., in McLish formation, where it showed mud and water on drill-stem test. Drilling was resumed after another Marshall County wildcat, Pure Oil Co.'s No. 1 Little, Section 28-5s-7e, found production in Tulip Creek sands.

GLENN McALLISTER has the contract to drill Carl Carter, Duncan, Okla., operator, and others' No. 1 Marshall, SE NE Section 1-1s-6w, wildcat 10 miles east of Duncan, Stephens County, Oklahoma. Contract calls for a 2,500-ft. test, but hole may be drilled to 3,500 ft. if indications justify. Location is on a Darby Petroleum Corp. farmout.

Drilling crew of Petre & McCracken, Centralia, Ill. The men are Jim McCracken, tool pusher and partner in the firm; Earl Dawes, driller; Bob Wilson; Jack Morrow, and H. L. Holden

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Michigan Field Report

Falling Production Causes Oil Men to Seek New Areas

By

OTTO C. PRESSPRICH

SAGINAW, Mich., Mar. 25.—With Michigan's daily average production of crude oil on the downgrade and reduced proration in force in the Freeman-Redding field of Clare County indicating still further decline in the present proven territory, oil interests were concerned with plans looking toward development in untested areas in the northern part of the Lower Peninsula.

The outlook, however, is not gloomy, and R. A. Smith, state geologist, predicts: "We will see oil development in this state for another 50 years." Prophesying that oil will be found in the northern areas at about the depths of those in the southwestern Michigan fields, Mr. Smith says he believes it almost certain that crude will be discovered in the area between the West Branch field and the Straits of Mackinac. West Branch to date is the most northerly field in the state. Describing the Michigan area as a basin, deepest in Central Michigan, the geologist is of the opinion that the northern counties will be found to comprise the rim of the "saucer" in a manner somewhat similar to that in Allegan, Van Buren, Kent and Ottawa counties. Pools in those counties, in some instances, have given indications of playing out, although the Kent-Ottawa field remains the principal producing area in Michigan today, now producing nearly 5,000 bbl. a day more than the field second in rank.

During the past week intensive wildcatting operations were continued as development proceeded uneventfully in the proven fields. Fifteen oil wells were completed for a combined initial potential of slightly under 2,000 bbl. a day. The week also saw completion of the first gas well to come in in several weeks. Ten wildcat oil tests were abandoned as dry holes, one location was abandoned and one gas test was recorded as a failure.

DAILY AVERAGE FOR FEBRUARY 1940

Pool—	Wells	Pipe line runs (Bbl.)
Porter-Yost	362	5,057
Greendale-Chippewa	187	1,295
Geneva-Midland	2	5
Sherman-Isabella	59	1,312
Wise-Isabella	24	1,717
Vernon-Leaton-Denver	78	717
Freeman-Redding	131	13,887
Grant-Clare	3	9
Beaverton	20	162
Edenville	28	393
Bentley-Gladwin	33	398
Buckeye-Wicklund-Oard	344	3,704
Ogemaw	230	1,578
Secord-Gladwin	2	0
Adams-Arenac	14	132
Clayton-Arenac	49	1,107
Tuscola	5	0
Saginaw Bay area	57	107
Birch Run	25	36
Dundee-Monroe	7	452
Montcalm County	36	358
Allegan—all pools	423	7,489
Holland-Ottawa	1	32
Zeeland-(Ottawa County)	2	0
Muskegon	67	66
Walker-Wyoming-Talmadge	312	18,560
Bloomingdale-Columbia	274	6,062
Bangor (Van Buren)	11	32
Total	2,786	64,667

New production was found in Allegan, Isabella, Kent, Ottawa, Monroe and Clare counties, the best well of the week being Gould & Cross' No. 2 Rigterink Brothers in Section 34 of Overisel, Allegan County. The well produced 400 bbl. a day, after it was acidized. One Dorr Township test and another in Salem were abandoned as failures.

Isabella County brought Central Michigan more into the picture with four new oil wells ranging from 22 bbl. to 250 bbl. a day, initially, after acid treatment. Best of the new Isabella wells, all in Wise Township, was McClanahan Oil Co.'s No. 1 Leosh in Section 17. Gulf Refining Co.'s No. 1 Burch in Section 17 was good for 128 bbl. a day. Other new Central Michigan production included the 85-bbl. Pure Oil Co.'s No. 2-A Austin in Claire's Redding Township. The Monroe County sector added a 100-bbl. producer to its string with completion by A. V. Oil & Gas Co.'s No. 1 Halberstadt in Section 31 of Summerfield Township.

Smith Petroleum Co. and C. A. Welsh recorded producer completions in Kent County, the Smith No. 4 Malloy being good for 120 bbl. a day, naturally, in Section 28, Walker Township, while Welsh's No. 2 Thurkettle was producing 50 bbl. a day after acid treatment. In adjoining Ottawa County were three new wells, George Kernodle's No. 1 Snip & Cook in Section 23 of Tallmadge, doing 75 bbl. a day; H. C. Williams' No. 1 Bryan in Section 25, good for 85 bbl. a day, and Edward B. Strom's No. 3 Masterson in Section 23, producing at the rate of 50 bbl. a day.

Drillers, meanwhile, abandoned wildcat tests in Midland, Missaukee and Shiawassee counties, and a few others, mostly edge tests in counties now getting production.

The new gas well is E. C. Dailey's No. 1 Keeler-Longnecker, completed at 1,224 ft. in the Michigan stray in Section 18, Richland Township, Monroe County. The test was making 6,710,00 cu. ft. a day.

Production in Clare County

The new Clare County proration order went into effect March 21 on orders of P. J. Hoffmaster, state supervisor of wells. The order reduced allowable production 25 per cent, and will reduce production from the field by 900 bbl. a day, on the basis of present number of producing wells. Reduced gas pressure and increasing evidence of water seepage prompted the order with a view to improving the ultimate production.

The Michigan Oil & Gas Association report on February production of Michigan shows an average of 64,667 bbl. a day for a month total of 1,875,343 bbl., lowest since September, although the number of producing wells increased from 2,753 to 2,786. The January production was 2,043,768 bbl., an average of 65,928 bbl. daily. Kent-Ottawa sector, with 312 producing wells, ranked first with 18,560 bbl. a day, a daily average increase of about 100 bbl. The Clare field, meantime, dropped 960 bbl. a day. Other areas showed little change.

During the week the state Conservation Department issued 19 oil and gas drilling permits to bring the year's total to 259. Allegan and Kent counties will have four tests each, Ottawa and Arenac trailing, each with three. Isabella, Clare, Calhoun, Muskegon and Kalamazoo counties each listed one.

Following is the well completions summary for the past week:

Allegan County

Dorr Township (4n-12w)—Fred Pope's No. 1 John Harnish, NE SE SW Section 18, was a dry hole, abandoned at 1,630 ft.

Heath Township (3n-14w)—Lang & Lewis, Inc.'s No. 1 Nevenzel, CE¼ NW SW Section 3, was producing 35 bbl. a day, naturally. Completion depth was 1,476½ ft.

Overisel Township (4n-14w)—Wiser Oil Co.'s No. 3 Justin Jurries, NW SW SE Section 34, completed at a depth of 1,436 ft., was good for 170 bbl. a day, naturally. Gould & Cross had the best well of the week in Michigan when No. 2 Rigterink Brothers, SE SE SW Section 34, produced initially at the rate of 400 bbl. a day, after the test was acid-treated. Total depth is 1,488 ft.

Salem Township (4n-13w)—Socony-Vacuum Oil Co.'s No. 2 Gordon Ledger, SE SW NW Section 14, completed at 1,581 ft., rated 97 bbl. a day, after an acid treatment, but Chief Oil & Gas Co.'s No. 1 John Commissaries, SE NE NE Section 9, was dry and abandoned at 1,650 ft.

Saugatuck Township (3n-16w)—W. J. Bernier's No. 1 Skinner, SW SW SE Section 26, was plugged when it failed to show oil at a depth of 1,346 ft.

Barry County

Rutland Township (3n-9w)—Sun Oil Co. abandoned No. 1 Harry Osborn, NW NW NW Section 11. The test was dry with the hole at a depth of 2,183 ft.

Clare County

Redding Township (19n-6w)—Pure Oil Co.'s No. 2-A H. H. Austin, C S½ SE SE Section 27, was completed at 3,910 ft. for production, after acid treatment, of 85 bbl. a day, while J. V. Wicklund Development Co.'s No. 2 L. G. Fell, C N½ NW SE Section 33, was dry hole, abandoned at 3,916 ft.

Isabella County

Wise Township (16n-3w)—J. V. Wickland Development Co.'s No. 1 Fred Busch, SE SW SW Section 29, produced 59 bbl. a day from 3,719 ft., after an acid treatment. Completed at 3,710 ft., Richard W. Reading's No. 1 Burwash-Reading, NW NE SW Section 16, was producing 35 bbl. a day, after it was acidized. McClanahan Oil Co.'s No. 1 Ivan Leosh, SE NE NW Section 17, was good for 250 bbl. a day, after acid treatment, from 3,728 ft., and Gulf Refining Co.'s No. 1 Minnie Burch, NE SE NW Section 17, was completed at a depth of 3,743 ft., treated with acid and placed in production with yield of 128 bbl. a day.

Kent County

Walker Township (7n-12w)—Smith Petroleum Co. and others completed No. 4 Thomas F. Molloy, NW SW SW Section 28, at 1,900 ft., the well being good for 20 bbl. a day, naturally. C. A. Welsh's No. 2 Jane Thurkettle, SE SE SW Section 29, total depth 1,875 ft., rated 50 bbl. a day, after acid treatment.

Wyoming Township (6n-12w)—Erbin Oil & Gas Co.'s No. 1 Michael Plat, NW NE NE Section 23, was a dry hole, abandoned at a depth of 1,920 ft.

Midland County

Larkin Township (15n-2e)—Associated Petroleum Co. and McClanahan Oil Co.'s No. 1 R. R. Lundstrom, C E½ SW NW Section 19, was dry and abandoned at 3,928 ft.

Missaukee County

Enterprise Township (23n-5w)—The C. W. Teater No. 1 Community Lease, C SE Section 31, a gas test, was abandoned at 1,005 ft.

Lake Township (22n-8w)—J. V. Wicklund Development Co. abandoned location for No. 1 Malone, C S½ SW NE Section 22.

Monroe County

Summerfield Township (6s-6e)—A. V. Oil & Gas Co.'s Ross Halberstadt, N½ S½ NW Section 31, completed at 2,115 ft., was reported good for 100 bbl. a day, after shot.

Montcalm County

Richland Township (2n-5w)—E. C. Dailey's No. 1 Keeler-Longnecker, NW SE NE Section 18, completed as a gas well at 1,224 ft., was gaged as a producer of 6,710,000 cu. ft. a day.

Ottawa County

Jamestown Township (5n-13w)—Dry at 1,729 ft., No. 1 Smalligan, NE NE NE Section 29, was abandoned by Lenoran Petroleum Co.

Tallmadge Township (7n-13w)—George Kernodle's

(Continued on Page 230)

Southwest Texas District

By F. L. SINGLETON

Tests This Week Will Show Results of Search for Wilcox

CORPUS CHRISTI, Tex., Mar. 25.—The search for Sparta-Wilcox production, centering along the old Jackson shore-line trend in Southwest Texas is expected to get results, good or bad, this week as production tests are scheduled to be made on two wells in Dewitt and Bee counties.

Atlantic Refining Co.'s No. 1 Conwell, Charles Lockhart Survey, 1½ miles west of the town of Thomaston, Dewitt County, drilled to a total depth of 8,519 ft., and 5½-in. casing was cemented at 8,396 ft. While top of the Teritary Wilcox, and details of the core record were not made available, the well is expected to test the interval from 7,850 to 7,908 ft., where a broken section of sand and sandy shale, having an oil and gas odor was logged.

In the West Tuleta field, Bee County, Mills Bennett Production Co. and Anderson-Prichard Oil Corp. were preparing to test No. 2 D. E. Robinson. A drill-stem test at 9,110-9,210 ft., total depth, recovered four joints of mud with no working pressure, and the hole has been plugged back to 7,900 ft., preparatory to testing at approximately 7,800 ft. This is the second deep test drilled in the field. It is northeast of No. 1 D. E. Robinson which blew out and was abandoned in a formation at 7,912-21 ft., total depth.

In the same county and about 7 miles southwest of Beeville, Bunte Brothers and others' No. 1 F. T. Earnest, Bee County School Land Survey, is drilling in shale at 9,780 ft. The well is reported to have attempted to blow out while drilling at 9,623 ft., but coring at 9,623-35 ft. recovered shale with no showing of oil or gas. In the old Pettus area, Union Producing Co.'s No. 56 Ray is drilling in shale below 8,069 ft.

Near the town of George West, Live Oak County, E. M. Jones' No. 1 West is shut down for repairs at 8,548 ft., while in Webb County Sinclair Prairie Oil Co.'s No. 1 Callaghan ranch is drilling in shale below 6,000 ft.

The extension of the Sparta-Wilcox play into Southwest Texas was started the latter part of 1939, and the showings logged in these deep tests are considered significant enough for a continuation of this play.

Victoria Field Extended

The importance of the Victoria field, Victoria County, just south of the town of Victoria, was enhanced by the completion of E. R. Kirkpatrick's No. 1 Deaver, which is flowing 15 bbl. of oil per hour through a ¼-in. choke. The well cored sand at 3,045-53 ft. It is producing through perforated casing. Approximately ½ mile southwest of production, Luling Oil & Gas Co.'s No. 1 Miller cored sand showing oil at 3,052-54 ft. and 3,060-63 ft., and salt water sand at 3,063-71 ft. Seven-inch casing was cemented at 3,071 ft., and the well is testing through perforated casing at 3,043-53 ft.

Kelsey's Big Extension

The Kelsey field was extended about 4,000 ft. west as Royal Oil & Gas Co.'s No. 1 Juarez is flowing an unestimated amount of gas and distillate through perforated casing at 4,675-80 ft. The well was drilled to a total depth of 5,638 ft., and 7-in. casing was cemented at 4,703 ft. The well is on the Starr County side of the field. Approximately 2½ miles southwest of the field, and about 5 miles northeast of the Sun field, Sun Oil Co.'s No. 1 Rodrigues is drilling in shale below 6,850 ft. with no additional showings reported.

Location for two more wildcats were announced for the Cockfield sector of Duval County. Approximately 9 miles northwest of San Diego, T. C. Rogers Survey, Section 276, Bridwell Oil Co. is preparing to spud No. 1 E. A. Parr. Southwest of the Fitzsimmons field about 2 miles, Sun Oil Co. staked location for No. 1 Garcia in the A.B.&M. Survey 407.

In Nuces County Wellington Oil Co. and Seaboard Oil Co.'s No. 1 Swenson estate, about 1½ miles south of the South Clara Driscoll field, is being watched with interest as drill-stem testing at 5,311-23 ft. is reported to have recovered a small amount of oil. West of the town of Bishop, House, Warren and others' No. 1 Davis is drilling in shale below 6,800 ft. Contract depth of 7,000 ft. is expected to be reached during the week.

Two wildcats were starting up in San Patricio County. Argo Oil Corp is rigging up No. 1 East, J. P. Borden Survey, about 3½ miles north of Mathis. Southeast of Mathis Midwestern Petroleum Co. is moving in material for No. 1 W. F. Timon, Block 29, San Patricio Town Tract subdivision.

In Karnes County A. D. Douglas' No. 1 S. E. Radford, about 5 miles southeast of Kenedy, is testing through perforated casing at 3,502-08 ft., and is reported to be showing some oil. Tubing pressure was 480 lb.

COMPLETIONS IN PROVEN FIELDS

Caldwell County

Dale field: Ralph Ogden's No. 2 Talley, 2,236 ft., 85 bbl., pumping and flowing.

Duval County

Benavides field: Bridwell Oil Co.'s No. 14 Ancira, 5,475 ft., dry and abandoned. Cedro Hill field: Humble Oil & Refining Co.'s No. 5-F Duval County Ranch Co., 1,435 ft., 42 bbl., ¼-in. choke. Magnolia Petroleum Co.'s No. 25 Duval County Ranch Co., sand 1,433-39 ft., 17 bbl., 16 hours, ⅝-in. choke. Hoffman field: Argo Oil Corp.'s No. 8-A Rodden, sand 2,697-2,712 ft., 24 bbl., 8 hours, pumping. Cox, Hamon and others' No. 17 Cuellar, sand 2,855-67 ft., 146 bbl., ⅝-in. choke. Magnolia Petroleum Co.'s No. 2 Well, perforated casing 2,604-13 ft., gas well. Peters field: Lanning, Noack and others' No. 1 Peters, 2,565 ft., dry and abandoned. G. G. Mortimer, sand 2,454-87 ft., 48 bbl., pumping. Sejita field: Standard Oil Co. of Texas' No. 1 Rodriguez, perforated casing 5,475-5,660 ft., 16 bbl., ¼-in. choke. Seven Sisters field: Pan American Production Co.'s No. 12-A C. Welder, sand 2,526-31 ft., 40 bbl., jetting. Tarancahuas field: Cox, Hamon and others' No. 3 Hoffman, sand 2,037-54 ft., 168 bbl., ⅝-in. choke. Cox, Hamon and others' No. 4 Hoffman-Gorman, sand 2,034-39 ft., 226 bbl. ⅝-in. choke.

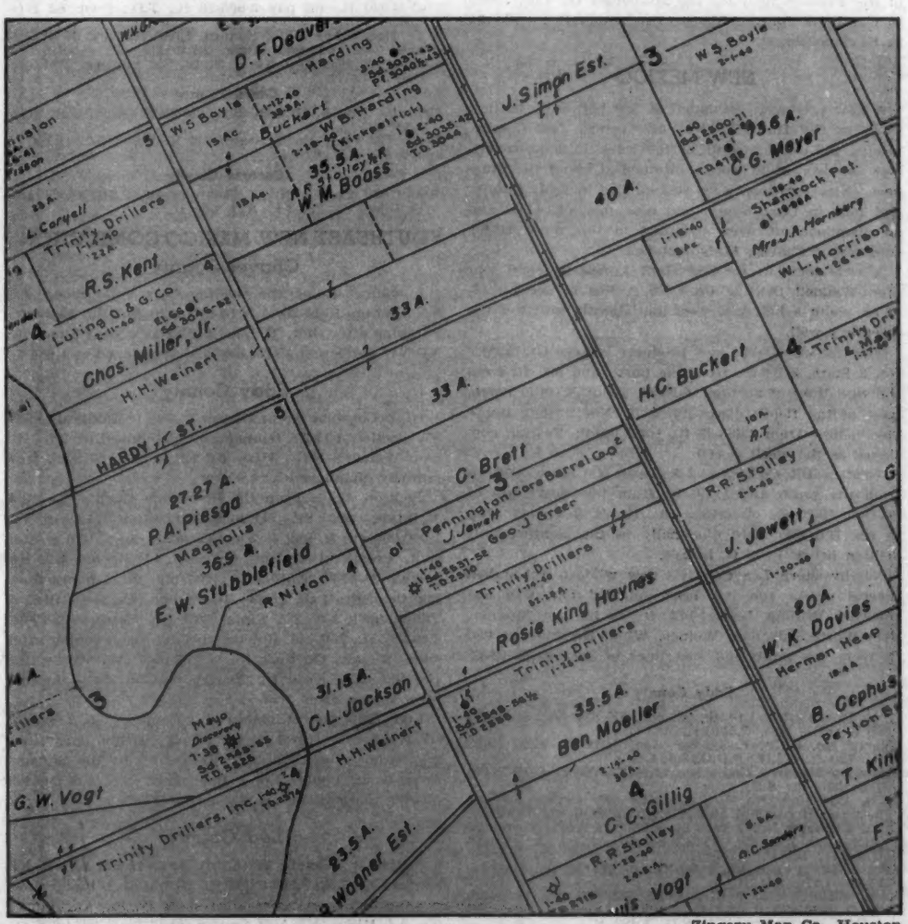
Calhoun County

Heyser field: Blanco Oil Co. and others' No. 18 Dunwoody, perforated casing 5,478-85 ft., 139 bbl., ½-in. choke.

Guadalupe County

Darst Creek field: Gulf Oil Corp.'s No. 9 Dix, 2,511

(Continued on Page 227)



Zingery Map Co., Houston

Victoria field, Victoria County, showing scope of development

Rocky Mountain Area

By T. R. INGRAM

Northern Wildcats Resuming; Lance Creek 2,500-Bbl. Well

DENVER, Colo., Mar. 25.—A number of scattered wildcats in the northern Rocky Mountain area are resuming after the winter shutdown.

The best completion of the week was Minnelusa Oil Corp. and MacKinnie Oil & Drilling Co.'s No. 8 Thompson, on the southwestern side of the Lance Creek field, which flowed 113 bbl. an hour from the Leo sand. The Continental Oil Co.'s No. 6 Rodeo-4, a Sundance sand well completed in 1939 for 380 bbl. a day in the new Sundance area on the east side of Lance Creek, was deepened 14 ft. and made 30 bbl. an hour. Ohio Oil Co.'s No. 6 Agnes Rohlff apparently defined the limits of the Leo and Joss sands on the north, finding water in both horizons.

Cut Bank, in Montana, had one completion in the Glacier Production Co.'s No. 1 Evans, which swabbed 171 bbl. the first 24 hours. Newell & Chandler's No. 1 Anderson, a wildcat north of the field, was deepened to the Madison, encountered water, and was abandoned.

The Angel Peak Oil Co.'s No. 9-B Government, San Juan County, New Mexico, was completed for 4,500,000 cu. ft. of gas per day, the largest gas well completed in the Kutz Canon field. Ben E. Keith's wildcat in San Miguel County, went into granite at 1,822 ft. and was abandoned.

New operations included one for the Continental Oil Co. in Lance Creek, a semiwildcat on the north flank of the Frannie field for the Minnelusa Oil Corp., two in Cut Bank for the Glacier Production Co., and one in Kevin-Sunburst.

NEW MEXICO

A new producer, estimated at 500 bbl. daily natural flow, in the Halfway field of western Lea County, headed the developments of the week in southeastern New Mexico. Field work continued at about the usual pace. Nine locations were staked, five in Eddy County and four in Lea County, and nine new oil wells and an abandonment were recorded in the three active counties of Chaves, Eddy and Lea.

A new location for the High Lonesome field was Stout-Waddell Drilling Co.'s No. 1 Iles in Section 17-16-29, about a half-mile west and slightly north of the discovery well.

The Halfway field's new producer is Argo Oil Corp.'s No. 2 State, 2,310 ft. from the north and 990 ft. from the west lines of Section 16-20-32, about ¼ mile northwest of the field's discovery well. No. 2 State found pay in lime from 2,686-89 ft., total depth. Testing continued as the week closed.

Westlea Oil Co.'s No. 2-A Texas Co.-State, 990 ft. from the south and 1,650 ft. from the west lines of Section 16-20-32, offsetting the firm's discovery well in the Halfway field diagonally to the southwest, is drilling below 1,175 ft. in salt.

Northwestern Lea County's new wildcat test staked several weeks ago has been spudded and was last reported drilling below 173 ft. It is Lou Stogner, Fort Worth, and Sam Weiner, Wink, No. 1 State, 660 ft. from the south and east lines of Section 30-12-32.

Eddy County

G. R. Burke's No. 1 State, SE cor. SE SW Sec. 36-16-24. (O.W.D.D.) S.D. 2,550 ft.
Everts' No. 1 Greer, SE cor. Sec. 31-16-31. C.O. 3,650 ft.; 700 ft. O.L.H.; S.D.O. 3,854 ft.
Everts & Moran's No. 1 Ranus, NE NW Sec. 18-23-26. T.D. 375 ft.; S.D.
J. B. Cowden's No. 1 State, SW SE Section 3-17-29, between Root field and High Lonesome field. M.I.M.
G. A. Grober's No. 1 Wright, 1,080 ft. from N and W lines, Sec. 25-18-28. Tstgf. S.O.&G. 1,382 ft.; est. 10 B.O.P.D.; S.D.R. 1,735 ft.
Artesia Drlg. Co.'s No. 1 Hoffman, SE SE SE Sec. 14-17-24. Drlg. 921 ft.
L. E. Elliott's No. 1 Elliott, SE SE SE Sec. 24-18-29. S.S.O. 3,255-75 ft.; S.D.O. 3,482 ft.; made 1 B.O. and 4 B.W. in 24 hrs.; S.D.W.O. 3,482 ft.
J. W. Elliott's No. 1 Cannon (O.W.D.D.), C SW SE Sec. 4-19-30. S.D.O. 3,421 ft.; sulf. wtr.
Trojan Oil Co.'s No. 1 Grant, SW SW NE Sec. 33-20s-25e. S.O. 1,530 ft.; S.D.R. 1,580 ft.
Anderson's No. 1 Neeson, 330 ft. from W and 2,310 ft. from N lines, Sec. 4-16-30. S.D.R. 2,630 ft.
Clark & Cooper's No. 1 Gates, 1,980 ft. S and E lines, Sec. 20-16-27. Drlg. 1,920 ft.
A. E. Frazier's No. 1 H. E. Yates, 330 ft. from N and 1,650 ft. from E lines, Sec. 6-20-27. S.D. 817 ft.
Frederick's No. 1 Reed, 1,980 ft. from S and W lines, Sec. 28-24-38 (O.W.D.D.). Est. 1,500,000 cu. ft. gas at 2,300 ft.; S.D. 2,893 ft.
Jack Harris' No. 1 Josey, 370 ft. from S and 2,310 ft. from W lines, Sec. 20-20-23. R.U. and S.D.
Wilder's No. 1 Young, 1,650 ft. from N and W lines, Sec. 23-16-29. S.G. 1,805 ft.; drlg. 2,880 ft.
Sam Montgomery's No. 1 Kaltenback, 330 ft. from N and W lines, Sec. 24-16-27. S.D.R. 2,065 ft.
Thomas & Bowers' No. 1 H. W. Etz, 2,310 ft. from N and 330 ft. from W lines, Sec. 13-16-30. Drlg. 3,059 ft.

Dona Ana County

Picacho O. & G. Co.'s No. 12 Armstrong, Sec. 15-23s-1w. S.D. 2,621 ft.
Slack & Mahres' No. 1 Simmons, Sec. 35-22s-5e. T.D. 2,785 ft.; S.D.O.

Chaves County

Farrar-Jones-Cunningham's No. 1 Samples, 330 ft. from S and E lines, Sec. 1-7-27. S.D.R. 98 ft.
G. H. Cowden's No. 1 Brunson, 330 ft. from N and W lines, Sec. 27-9s-30e. S.D. bond 225 ft.
T. S. Stanfield's No. 1 Bogle, 330 ft. N line and 2,310 ft. E line, Sec. 27-13-25. Drlg. 1,223 ft.

Luna County

O. D. Berry's No. 2 Berry, Sec. 33-22-10. Drlg. 140 ft.

Lea County

Culbertson & Irwin's No. 1 Lankford, 660 ft. from N and 1,980 ft. from W lines, Sec. 25-23-36. Gas from 2,955-3,007 ft.; increased to 75,000,000 cu. ft. per day at 3,030 ft.; oil pay 3,005-18 ft., T.D.; flwd. 62 B.O. P.D., test.
J. D. Barefield's No. 2 Stroup, 1,980 ft. from N and E lines, Sec. 12-18-32. Drlg. 2,735 ft.
Stogner & Weiner's No. 1 State, SE SE Sec. 30-12-32. Drlg. 173 ft.

Otero County

Ernest's No. 1 Ernest, Sec. 20-25-7. Fsg. U.R. lugs 2,826 ft.
Otero Oil Co.'s No. 1 State, SE NW Sec. 5-22-10. C.O. 560 ft.; T.D. 825 ft.

Socorro County

Joiner Oil Corp.'s No. 1 Belen grant, 2,310 ft. N and W lines, Sec. 16-3-1. S.D. 600 ft.

SOUTHEAST NEW MEXICO COMPLETIONS

Chaves County

A wildcat, Comanche Drilling Co.'s No. 4 Sloop, NE NE Section 15-11-26, 1,262-74 ft., 20 bbl. in 12 hours pumping after shot. Heimes & Martin's No. 1 Stephens, NE NW Section 22-15-29, dry and abandoned at 1,835 ft.

Eddy County

High Lonsome area: Dodson's No. 1 McElreath, SW SW Section 3-16-29, temporarily abandoned at 2,750 ft. Sam Weiner's No. 1 Hess, SE SE Section 9-16-29, temporarily abandoned at 1,925 ft.

Jackson field: Franklin Petroleum Corp.'s No. 2-A McIntyre, SE SE Section 20-17-30, 1,774-1,819 ft., 1,000,000 cu. ft. gas flowing through open casing after shot. Premier Petroleum Co.'s No. 4-F Beeson, SW NE Section 31-17-30, 2,811-31 ft., 157 bbl. in 14 hours flowing through ¼-in. choke after shot. Carper, Miles & Tallmadge's No. 2-A State, SW NE Section 32-17-30, 2,864-82 ft., 250 bbl. flowing through open tubing after shot. Repollo Oil Co.'s No. 8-A Parke, SE SW Section 15-17-30, 3,255-3,430 ft., 25 bbl. flowing daily through open tubing after acid.

Loco Hills field: Underwood & Sanders' No. 1 Travis, NE NE Section 17-18-29, 2,541-81 ft., 95 bbl. daily flowing through open tubing after shot. In the Shugart field, G. E. Bobb's No. 1 Vandagrift, SW NE Section 6-19-30, temporarily abandoned at 855 ft.

Lea County

Maljamar field: R. W. Fair's No. 3-B Baish, NW NE Section 27-17-32, 3,855-3,945 ft., 90 bbl. in 6 hours flowing through open casing after shot. Barney Cockburn's No. 5-A Miller, NE NW Section 23-17-32, 3,780-4,065 ft., 120 bbl. daily flowing through open tubing after shot.

Vacuum field: Humble Oil & Refining Co.'s No. 15-K State, SW SE Section 32-17-35, 4,265-4,650 ft., 324 bbl. in 8 hours flowing naturally through open tubing. Phillips Petroleum Co.'s No. 38 Santa Fe, NW NE Section 5-18-35, 4,200-4,642 ft., 108 bbl. in 5 hours flowing through ¾-in. choke after acid. Magnolia Petroleum Co.'s No. 54 State-Bridges, SE SE Section 14-17-34, 4,452-4,660 ft., 291 bbl. in 19 hours flowing through open tubing after shot.

Penrose field: Gulf Oil Corp.'s No. 4-C Christmas, SW NW Section 18-22-37, 3,655-3,740 ft., 419 bbl. daily, naturally, through open tubing. Gulf Oil Corp.'s No. 3-A Cole-State, NE SE Section 16-22-37, 3,640-3,715 ft., 82 bbl. daily flowing through open tubing naturally. Two-States Drilling Co.'s No. 6-B State, NW NE Section 16-22-37, 3,600-98 ft., 32 bbl. in 8 hours flowing through 14/64-in. choke after acid.

Eunice field: Ohio Oil Co.'s No. 15 State-McDonald, NE NE Section 14-22-36, 3,729-3,805 ft., 24 bbl. in 6 hours flowing through open tubing after acid.

Skelly field: Lem Peters' No. 3-H State, SE SE Section 34-22-37, 3,575-3,654 ft., 60 bbl. daily flowing through open tubing after shot.

Lynn field: Shell Oil Co., Inc.'s No. 3 R. Whitten, NW NE Section 33-23-36, 3,589-3,636 ft., 180 bbl. daily, naturally, flowing through 42/64-in. choke.

Langlie field: Anderson-Prichard Oil Corp.'s No. 12 Wells, SE NW Section 4-25-37, abandoned at 620 ft.

COLORADO

El Paso County

F. F. Hintze et al's No. 1 State, CEL SE SE Sec. 16-11s-60w. S.D. 895 ft.; to run 8-in.

Huerfano County

I. E. Sideman-White et al's No. 1 Martinez, C SW NE Sec. 33-26n-67w. Drlg. below 1,000 ft.

La Plata County

Nick Spatter's No. 1-X Bryce, C SW SW Sec. 31-33n-9w. Drlg. sh. 3,220 ft.

Larimer County

Ed Shogren et al's No. 1 Frazier, SE Sec. 31-4n-69w. S.D. 450 ft.
L. R. Steele et al's No. 1 Mundt, NE NE NE Sec. 7-3n-69w. Drlg. 2,115 ft.

Montezuma County

McElmo Oil Co.'s No. 1 West, NE NW NE Sec. 31-36n-17w. Drlg. blk. L.&sh. 5,285 ft.; S.S.O.; est. 2,000,000 cu. ft. gas at 5,241 ft.

Park County

South Park Oil Co.'s No. 1 Lemar, NE NE SE Sec. 34-11s-75w. Drlg. 7,182 ft.

Moffat County

Great Divide Pet. Co.'s No. 1 Wyatt, SE Sec. 4-6n-92w. S.D. 724 ft.; 10-in. froze at 650 ft.; will res. as soon as weather conditions improve.

Rio Blanco County

Texas Co.-California Co.'s No. 3 Unit, NE NE NE Sec. 27-3n-94w. T.D. 765 ft.; M.I. to res.

Routt County

L. C. Craig-E. L. Moore's No. 1-X Erwin, C SW NE Sec. 33-7n-85w. T.D. 2,220 ft.; trying to recmt. 6⅝-in. at 2,055 ft.

Washington County

Thurman Oil Tr.'s No. 1 Ruby, NW NW SW Sec. 3-5s-52w. Drlg. 1,365 ft. with rot. tools.

WYOMING

Big Horn County

Frank S. Scott's No. 1 Robertson, SE SE SE Sec. 6-54n-93w. S.D. 650 ft.; indef.
Yale Oil Corp.'s No. 1 Simonson, Lot 53, Sec. 34-55n-97w. T.D. 4,412 ft.; cmtd. 7-in. at 4,029 ft.; some sat.

Carbon County

Ohio Oil Co.'s No. 12 State, CWL NE Sec. 34-20n-78w. Loc.
Tri-State O. & R. Co.'s No. 17, NW SE NW Sec. 20-21n-80w. S.D. 585 ft.

Converse County

Shawnee Expl. Co.'s No. 1 Salisbury, SE SW NE Sec. 27-32n-69w. Rdy. to spd.

Fremont County

Pilot Oil Co.'s No. 5 Enos, CSL SE NE Sec. 21-3n-1w. Cmtd. 8⅛-in. at 125 ft.; W.O.C.

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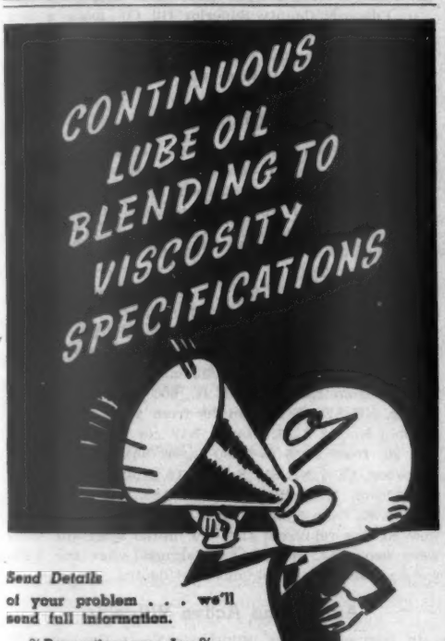

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Tropic Oil Co.'s No. 1 Govt., C SE SW Sec. 34-27n-80w. T.D. 3,495 ft.; cmtd. off tools after sdtrkg.
F. F. Hintze's No. 1 Govt., CWL NW NW Sec. 7-28n-92w. T.D. 1,135 ft.; ga. 3,000,000 cu. ft. gas at 1,030-1,112 ft.; open 10 min.; after 20 min. dropped to 500,000 cu. ft.

Hot Springs County

Oscar B. Grace's No. 5 Govt., Lot 3, SE NW Sec. 21-43n-92w. Drlg. 430 ft.
Campbell et al's No. 2 Kyne, NW SE SW Sec. 22-43n-92w. Drlg. 385 ft.

Lincoln County

H. C. Harris et al's No. 1 Govt., SE NW NW Sec. 23-21n-117w. Drlg. 2,741 ft.
Fontenelle Dev. Co.'s No. 1 Pomroy, NE SW Sec. 5-24n-113w. T.D. 600 ft.; prep. to run 10-in.

Natrona County

General Pet. Corp.'s No. 121-G NW NW NW Sec. 21-35n-77w. T.D. 8,002 ft.; will run 7-in. before drlg. in and tstg.

Niobrara County

Producers on leases held under the old placer claims in the Lance Creek field which are being contested by the Department of the Interior have notified royalty owners that beginning February 1 royalties accruing from current production are being impounded until the question of title is settled. The Government charges that a discovery was not made on each of these claims prior to October 16, 1918, the date on which the lands were withdrawn from entry, and that work leading to discovery was not being continued with diligence on that date, and that in respect to some of the claims they were abandoned by the claimants. Answers have been filed or will be filed denying the charges so made. The Buck Creek Oil Co., subsidiary of the Continental Oil Co., advised its royalty owners that "It is believed that the Government after a hearing on the contests will be satisfied that the charges so made by it after 22 years of development are unfounded in fact and law." In the meantime it is expected that new work on the disputed claims will not be undertaken at this time.

A good completion was reported in the Minnelusa Oil Corp. and MacKinnie Oil & Drilling Co.'s No. 8 Thompson, SW NE NW Section 7-35n-65w, on the southwestern edge of the field, an east offset to Price's No. 2 Lamb. It flowed 113 bbl. an hour on a 12-hour test at 5,379 ft., total depth, from the Leo sand at 5,336-79 ft.

The Continental Oil Co.'s No. 6 Rodeo-4, NW NW NE Section 35-36n-65w, in the new Sundance sand area on the northeastern side, was deepened from 4,090 ft. to 4,104 ft. and made 30 bbl. an hour from the Sundance. It was originally completed in July 1939 for 380 bbl. per day in the Sundance at 4,075-90 ft.

The Continental Oil Co.'s No. 6-A Schuricht, SE NE SE Section 6-35-65, on the west side, which was noncommercial in the Leo sand, is drilling on down to test the Joss sand. At 5,200 ft. it swabbed 30 bbl. in 24 hours after acidizing with a total of 3,000 gal.

The Ohio Oil Co.'s No. 6 Agnes Rohlff, an outside well on the north, which had water in the Sundance and Leo sands, cored a water sand at 5,723-29 ft. and dry sand at 5,729-31 ft. and picked up more water in the Joss formation at 5,739 ft. It will plug back and test upper horizons.

The Continental Oil Co. is building rig for its No. 3 Emil Rohlff, ⅛ mile to the southwest of the Ohio Oil Co.'s No. 6 Rohlff, and a west offset to its No. 1 Emil Rohlff.

Continental Oil Co.'s No. 3 E. Rohlff, SE SW NW Sec. 32-36n-65w. B.R.; (first report).
Ohio Oil Co.'s No. 8 State-Lamb, NW NW NW Sec. 36-36n-65w. Drlg. 2,220 ft.
MacKinnie O. & D. Co.-Minnelusa Oil Corp.'s No. 9 Thompson, NW SE NW Sec. 7-35n-65w. Rig; W.O. equip.
Continental Oil Co.'s No. 18 Tom Bell, SE NE NE Sec. 33-36n-65w. Drlg. 3,504 ft.
Continental Oil Co.'s No. 7-B Dielman, SE SE NE Sec. 7-35n-65w. B.R.
Ohio Oil Co.'s No. 16 Putnam, SW SW NW Sec. 4-35n-65w. Loc.
Continental Oil Co.'s No. 6-B Dielman, NE SW NW Sec. 8-35n-65w. Drlg. 3,950 ft.; T. Dak. 3,510 ft.
Minnelusa Oil Corp.'s No. 1 Joss, NE SE NW Sec. 6-35n-65w. Drlg. 5,380 ft.; T. Leo 5,232 ft.; cd. sat. L.
Continental Oil Co.'s No. 6 Apex-O.P.C.-4, SW NW NW Sec. 35-36n-65w. B.R.
Ohio Oil Co.'s No. 14 Carrie Putnam, NW SW SW Sec. 33-36n-65w. Drlg. 5,261 ft.; T. Leo 5,170 ft.
Ohio Oil Co.'s No. 15 Carrie Putnam, NW NE SW Sec. 33-36n-65w. Rig; W.O. equip.
Continental Oil Co.'s No. 10-B Schuricht, SE SE SE Sec. 6-35n-65w. Drlg. r.b. 4,577 ft.; T. basal Sundance 3,986 ft.
Continental Oil Co.'s No. 6-A Schuricht, SE NE SE Sec. 6-35n-65w. Drlg. 5,344 ft.
Continental Oil Co.'s No. 5 Apex-O.P.C.-1, NE SW NE Sec. 34-36n-65w. T.D. 4,158 ft.; swbd. 40 bbl. through tbg. after shot; installing pmp.
Ohio Oil Co.'s No. 6 Rohlff, SE NW NE Sec. 32-36n-65w. T.D. 5,739 ft. in Joss sd.; will P.B.
H. D. Moore's No. 1 Berggren, SE NW Sec. 23-35n-63w. T.D. 2,526 ft.; rng. 4¾-in. for W.S.O.
Ohio Oil Co.'s No. 8 Converse Sheep, NW SE SW Sec. 32-36n-65w. Cg. 5,001 ft. for T. of Joss sd.

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To install, slide spiral guide over the casing to desired position with keyed slot in down position. Clamp guide to casing with rope binder until guide has desired diameter. Weld keys to casing. Remove binder and the outside diameter of the spiral springs is then at set diameter. On streamline pipe, split spiral guide vertically with cutting torch, place around casing, and re-weld.

Order through any recognized supply house. If your supply house does not have our Spiral Guide in stock, phone or wire any of our offices, at our expense, and delivery will be made promptly.

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4½"	5-39/64"	5	$45.50
5"	5-39/64"	5	46.00
5½"	6-1/8"	5	46.50
5¾"	6-3/8"	5	48.00
6"	6-5/8"	6	48.50
6⅝"	7-1/4"	6	49.00
7"	7-5/8"	6	49.50
7⅝"	8-15/64"	7	51.00
8⅝"	9-19/32"	8	52.50
9"	9-5/8"	8	54.00
9⅝"	10-7/16"	9	55.50
10¾"	11-9/16"	10	57.00
11¾"	12-19/32"	11	58.00
12"	13-5/8"	13	60.00
13⅜"	14-7/32"	13	61.50
16"	16-27/32"	16	65.00

Standard length of guides, 42". Standard spring bow, 5" beyond casing diameter. Spring width, 1½". Spring thickness 1/8" and 3/16". 3/16" is recommended only in well orientation or where guide is run 1,000' or more above the shoe.

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Park County

The Minnelusa Oil Corp. has let contract to Manning & Martin, Inc., for a semiwildcat on the north side of the Frannie dome in its No. 1 Government. It is ½ mile east of two producers near the C Section 23, and ½ mile north of the nearest well.

Minnelusa Oil Corp.'s No. 1 Govt., C SW NW Sec. 24 58n-98w. M.I.M.; (first report).

Sublette County

Marvel Oil Co.'s No. 1-H Govt., CEL NE SE Sec. 28-27n-113w. S.D. after R.U.
North La Barge Oil Co.'s No. 1 Govt., SW NE SE Sec. 8-27n-113w. Drlg. below 1,850 ft.; 6⅝-in. at 1,830 ft.; not cmtd.

Sweetwater County

Sinclair-Wyoming Oil Co.'s No. 92-A, NE NW SW Sec. 11-26n-90w. Drlg. 670 ft.; 10¾-in. cmtd. at 45 ft.
Sinclair-Wyoming Oil Co.'s No. 91-A, SE NE NE Sec 10-26n-90w. Drlg. 2,006 ft. in Sundance.
Vermillion Oil Co.'s No. 2 Govt., SW SW SW Sec. 7 12n-99w. Drlg. 2,539 ft.

Washakie County

Paul Boether's No. 1 Govt., SW SW NW Sec. 4-47n-90w. T.D. 2,160 ft. in Thermopolis sh.; 7-in. at 2,090 ft.

Weston County

Patterson Oil Co.'s No. 21 fee, NW SW SE Sec. 17-46n 63w. Drlg. 575 ft.
Wheedon Oil Co.'s No. 5 State, NW SW SE Sec. 16-46n-63w. Drlg. 182 ft.
Gose Oil Synd.'s No. 1, NE NE NE Sec. 28-47n-63w. Drlg. 4,963 ft.
Bruce C. Teeter's No. 1 State, C SW NE Sec. 36-32n-61w. S.D. 2,270 ft.; may go to Bell sd.
Butcher Bros.' No. 5, SW NW NE Sec. 16-46n-63w. R.O.G.

MONTANA

Blaine County

F. J. Buscher's No. 1 Evey, C NE SE Sec. 12-32n-17e. S.D. 61 ft.

Carbon County

The Ohio Oil Co.'s No. 9 Souders, C NE SW Section 2-7s-21e, Dry Creek field, which has been pumping for the past 3 months at 5,511 ft., total depth, in an attempt to exhaust the water, is now making 200 bbl. of fluid per day, of which approximately 70 per cent is water. At the beginning of the test it made only water. This well was originally completed at 5,493 ft. in 1933 after plugging back from 5,509 ft., as one of the best wells in the field, making around 1,000 bbl. per day from the Lakota. Early last November it was deepened to 5,511 ft. with results noted above.

Glacier County

The Great Northern Railroad has announced that the rate on crude oil from Cut Bank to Spokane, Wash., will be reduced from 22½ cents to 18 cents per cwt., effective April 13. The Inland Empire Refineries, Inc., which operates a refinery at Spokane, postponed action at a meeting 2 months ago on a proposal to build a 320-mile pipe line from Cut Bank to Spokane when informed that the railroad soon would put in rates which would have a bearing on the situation. Whether these will be sufficiently low to satisfy the oil interests has not been stated, but it is understood that should the plans for the pipe line go ahead, the project has been assured of financing.

Glacier Production Co.'s No. 1 Evans, C SW NE Section 21-33n-5w, on the east side of the field close to the oil-gas line, was completed in the Cut Bank sand at 2,940 ft., total depth, and swabbed 171 bbl. the first 24 hours. It is an area which was proven for oil last year in several good wells, some of which produced from the Sunburst sand, and which marked the most important extension of the field during 1939. It had the Sunburst at 2,810-20 ft., which was barren, and the Cut Bank at 2,880-2,937 ft., with the main pay at 2,925-37 ft.

The Glacier Production Co.'s No. 2 Maltby, C NE NE Section 8-33n-5w, which was reported a completion last week for 104 bbl. the first 10 hours, swabbed 224 bbl. the first 24 hours.

Newell & Chandler's No. 1 Anderson, C NE NW Section 1-36n-6w, a wildcat to the north of the field, which last week was reported a completion at 3,140 ft. with nominal results, resumed drilling to go to the Madison lime. It topped the Madison at 3,223 ft. and at 3,223-40 ft. showed some oil in the cores, but a drill-stem test at 3,235 ft. failed to disclose either oil or water. At 3,243-45 ft. it ran into black sulfur water and will be plugged and abandoned.

Two new locations were released by the Glacier Production Co.

Glacier Prod. Co.'s No. 4 Bonnett, C SW SE Sec. 4-32n-5w. R.O.G.; (first report).
Glacier Prod. Co.'s No. 4 Van Ormer, C SW SE Sec. 8-33n-5w. R.U.; (first report).
Texas Co.'s No. 4 Tweedy, C SE NW Sec. 21-35n-6w. B.R.
Texas Co.'s No. 1 Unit 11, C NE SW Sec. 11-35n-6w. Drlg. 445 ft.
Annand Hutchings' No. 4 Federal Land Bnk., 2,310 ft. from W, 2,310 ft. from S lines, Sec. 11-34n-6w. Drlg. 500 ft.
Santa Rita O. & G. Co.'s No. 10 Tribal, NW NW NW Sec. 15-35n-6w. Drlg. 1,900 ft.
A. B. Cobb's No. 5 Van Demark, CSL SE NE Sec. 35-35n-6w. Loc.
A. B. Cobb's No. 5 Walberger, CNL NE SE Sec. 35-35n-6w. R.O.G.
Glacier Prod. Co.'s No. 1 Barrington, CSL NE SW Sec. 19-33n-5w. Cmtd. 7-in. at 2,999 ft.; W.O.C.
Santa Rita O. & G. Co.'s No. 4 Stahl, CSL NW SE Sec. 20-33n-5w. Drlg. 2,400 ft.
British American Oil Co.'s No. 12 Tribal, C SE NW Sec. 34-35n-6w. T.D. 2,885 ft.; fsg. tools.
R. C. Tarrant's No. 5 State, NW NE SE Sec. 36-34-6w. Drlg. 2,430 ft.
Helmac, Tr.'s No. 3 Govt., Lot 3, Sec. 32-33n-5w. R.O.G
Cobb-Reagan's No. 4 Jackson, SW SW SE Sec. 5-32n-6w. R.U.R.

Petroleum County

H. Clark Rowland's No. 1 Brundige-Mink, NE SE NW Sec. 35-14n-25e. T.D. 722 ft.; 8⅝-in. on bttm.; prep. to res.

Toole County

Coolidge & Coolidge's No. 3 McCurdy, SE NW SW Section 2-35n-3w, encountered water in the contact at 1,893-1,903 ft. and drilled to 1,960 ft. without changing results. It was plugged and abandoned.

A. Beardslee's No. 13 Swears, CEL SE NW Sec. 9-35n-2w. Drlg. 430 ft.; (first report).
G. H. Lund's No. 1 Dahlen, C SE NW Sec. 35-35n-4w. T.D. 1,980 ft.; prep. to D.D.; (O.W.D.D.).
R. G. Parrant's No. 1 Holbrook, C NW NE Sec. 2-36n-3w. T.D. 1,445 ft.; swdg. out csg.
Prewol & Shay's No. 5 Govt., SE NW SW Sec. 11-35n-3w. Drlg. 1,760 ft.; 5½-in. cmtd. 1,700 ft.
Mosby Oil Corp.'s No. 3 Pederson, SE NW SE Sec. 7-35n-2w. T.D. 1,678 ft.; tstg.
Casper T. Olen's No. 9 Engemoen, NW NE NW Sec. 14-35n-2w. S.D. 70 ft.
L. J. Yealy's No. 14 Shaw, NW SW NE Sec. 35-36n-2w. R.O.G.
Superior Pet. Co.'s No. 3 Haugen, C NE NE Sec. 11-35n-3w. Drlg. 1,555 ft.
Lemac Oil Co.'s No. 1, C NE NE Sec. 27-36n-2w. T.D. 1,906 ft.; contact 1,900-06 ft.; good S.O. in sdy. L.; S.D.

UTAH

Grand County

Reeder Corp.'s No. 1 State, NE NE NE Sec. 16-22s-19e. Drlg. 1,040 ft.

Summit County

Longwell Pet. Co.'s No. 1, SE SW SE Sec. 35-3n-5e. T.D. 3,274 ft.; tstg. S.O. in sd. at 3,256-74 ft.

SOUTH DAKOTA

Butte County

Two Top O. & G. Co.'s No. 2, SE NE Sec. 30-10n-6e. S.D. 2,147 ft., for repairs.

NORTHWEST NEW MEXICO

Bernalillo County

Norins Realty Co., Inc.'s No. 2 North Albuquerque, NE SE NW Sec. 19-11n-4e. S.D. 4,710 ft.
Norins Realty Co., Inc.'s No. 2 Pajarito, Sec. 22-9n-1e. S.D. 2,000 ft.

McKinley County

Petroleum Products Corp.'s No. 7 Hospah, C SW SW Sec. 36-18n-9w. Spd. to 50 ft. and S.D. acct. of wthr.

San Juan County

A lease on approximately 400 acres in Sections 35 and 36-29n-18w (unsurveyed), in the Navajo Indian Reservation, southeast of the Rattlesnake field, will be

(Continued on Page 230)

Illinois Fields

(Continued from Page 210)

with a very small percentage of water. Alma Oil Co.'s No. 1 Ray, NE NE SW Section 9-1s-2e, Bethel sand at 1,911-18 ft., 5 qt. shot, pumped 26 bbl. of oil and 1 bbl. of water.

In Wayne County Snyder's No. 3 Vaughn, NW NE NW Section 35-2s-8e, topped Ste. Genevieve lime at 3,313 ft., had pay at 3,352-58 ft. and 3,372-80 ft. It was acidized with 5,000 gal. and flowed 165 bbl. per day by heads.

In Wabash County Mabee Drilling Co.'s No. 5 Bump, had Cypress sand at 2,403 ft., pay at 2,429-46 ft., was shot with 15 qt. at 2,424-28 ft., and pumped 192 bbl. Continental Oil Co.'s No. 2 LeGier, SE NW SE Section 17-2s-13w, Cypress sand at 2,466-91 ft., pumped 167 bbl. per day without a shot. Delta Drilling Co.'s No. 1 Gray, Cypress at 2,466-77 ft., shot with 20 qt., pumped 38 bbl.

In Wayne County Texas Co.'s No. 3 Heaton, CE½ NW NE Section 17-3s-7e, was dry and abandoned at 3,400 ft. St. Louis lime was topped at 3,391 ft.

In Hamilton County Texas Co.'s No. 1 Provident Mutual Life, CN½ NW NW Section 21-3s-7e, was dry and abandoned at 3,427 ft., St. Louis lime was topped at 3,419 ft. There was a showing of oil at 3,315-18 ft., and at 3,325-41 ft. in Rosiclare.

In the Irons pool, in White County, Kingwood Oil Co.'s No. 1 Bailey, SE NE NW Section 25-6s-8e, found Hardinsburg sand at 2,472 ft. and shot it with 10 qt. at 2-509-19 ft., the total depth. It pumped 481 bbl. initially. W. C. McBride, Inc.'s No. 2 O. Johnson, NE NW NE Section 25-6s-8e, pumped 792 bbl. a day from Hardinsburg sand at 2,513-26 ft., which had been shot with 8 qt.

Anding and others' No. 1 Phillips, CN½ SW NE Section 15-6s-9e, in White County, was dry and abandoned at 2,712 ft.

New Wildcat Operations

In Effingham County Peyton & McGraw made a location for No. 1 W. E. Beek, 60 ft. from south and 100 ft. from west lines of SW SW Section 30-9n-4e.

In Schuyler County Harry Miller was drilling at 300 ft. in No. 1 Feldheimer, 1,105 ft. from north and 813 ft. from west lines of NW Section 12-3n-3w, of the fourth principal meridian.

In Marion County Swan-King Oil Co made a location for No. 1 Bilek, NE SE NE Section 2-3n-2e; Baldwin and others' No. 1 Schaffert, 50 ft. from south and 50 ft. from west lines, SW SE Section 4-2n-1e, old total depth 3,023 ft., rigging up standard tools to drill to Trenton lime.

In Clay County Kingwood Oil Co. made a location for No. 1 Frank Neff, SE SW NW Section 14-2n-7e. Pure Oil Co.'s No. 1 Lewis Miller-A, total depth 3,105 ft., had a show of oil at 3,067-73 ft. in dolomite. It was acidized with 5,000 gal. and 1,200 ft. of sulfur water rose in the hole, with no showing of oil. The crew was testing.

In Wabash County Mode & Bruce had rig up for No. 1 Seiler, NE SE NW Section 30-1s-12w.

In Edwards County Superior Oil Co. made a location for No. 1 Woods, C NW SW NW Section 19-2s-11e.

In Jackson County Trans-State Oil Co. was moving in material for No. 1 Burroughs, C SW SE SW Section 6-7s-1w.

Salem Wells Deepened

Magnolia Petroleum deepened a number of its wells in the Salem field re-completing them with the following results: No. 24 Chitwood, NW NW SE Section 16-2n-2e, deepened from 1,835 to 2,075 ft., 155 bbl. a day; No. 22 Chitwood, SE NE SW Section 28, deepened from 1,816 to 1,868 ft., 100 bbl. of oil and 36 bbl. of water; No. 20 Chitwood, SE NE SW Section 28, from 1,804 to 1,819 ft., 134 bbl.; No. 2 D. A. Shanafelt, NW SE NE Section 32, from 1,757 to 1,845 ft., 556 bbl.; No. 14 J. H. Young, SW NW SW Section 21, 301 bbl.; No. 5 J. H. Young, SW SW SW Section 21, 1,867 to 1,870 ft., 885 bbl.; No. 7 S. Shanafelt, SW SW SE Section 29, from 1,779 to 1,865 ft., 666 bbl.; No. 44 J. H. Young, NE SE SE Section 20, from 2,044 to 2,135 ft., 52 bbl.; No. 52 J. H. Young, NW cor SE NE SE Section 20, from 2,055 to 2,280 ft., 60 bbl.; No. 41 W. O. Chitwood, CS½ NE SW Section 16, from 2,047 to 2,070 ft., 160 bbl.; No. 4 D. A. Shanafelt, SE cor. NW SE NE Section 32, from 1,793 to 1,875 ft., 278 bbl. The production figures represent the new initial after the wells were deepened. It was not learned what the wells were producing at their old total depths.

Among the Active Wildcats

In Iroquois County Whitlow's No. 1 Gannon, NW cor. NE SW SE Section 5-27n-12w, drilling at 225 ft.

In Tazewell County Bartelmay's No. 1 Mathis, SW NW SW Section 24-25n-3w, total depth 340 ft., running casing.

In Edgar County S. J. Burkitt's No. 1 Schotker, CW½ NW SE Section 30-16n-11w, set 6⅝-in. casing at 1,630 ft., total depth 1,633 ft., trying to get a water shut-off.

In Macon County Jarvis' No. 1 Veeck, SE SE NE Section 11-16n-3e, drilling at 2,048 ft.

In Christian County Moore and others' No. 1 Meyers, SE SW SE Section 7-13n-1e, total depth 1,330 ft. Shut down for orders; Fredonia lime topped at 1,295 ft.

In Shelby County O. Baugher's No. 1 Anderson, NW cor. Section 36-12n-5e, total depth 1,500 ft., waiting for casing.

Carter Oil Co.'s No. 1 J. H. Seaman, NW NE SW Section 35-12n-7e, Coles County, will be drilled to Trenton lime. It was at a total depth of 3,920 ft.

In Clark County Snavely's No. 1 Scholfield, SE NE SE Section 6-11n-11w, Salem lime topped at 1,383 ft., drilling below 1,595 ft. Allen and others' No. 1 Biggs, NW NW SW Section 9-11n-14w, drilling at 1,920 ft. Snavely's No. 1 S. Freeman, NW SW NW Section 4-8n-11w, drilling at 1,168 ft.

In Montgomery County Jack Brown's No. 1 Lipe, SW SW SE Section 28-10n-3w, drilling below 200 ft.

In Jersey County A. W. Gerson's No. 1 Knight, N½ NW NW Section 32-7n-11w, total depth estimated to be 2,235 ft., ran Schlumberger test and then shut down.

In Fayette County B. Green's No. 1 McDonald, NW NE NW Section 23-7n-1e, drilling below 265 ft.

In Bond County Paul Harr's No. 1 Thacker, CE½ NE Section 29-7n-4w, total depth 1,965 ft., rainbow of oil through a hole full of water, shut down for orders. W. N. Lee's No. 1 Scharf, NE SW SE Section 27-7n-4w, total depth 2,016 ft., plugged back to 605 ft., and running 10-in. casing.

In Crawford County La Salle Drilling Co.'s No. 1 Berryhill, NE NE NW Section 9-6n-13w, total depth 2,976½ ft., set 7-in. casing at 2,795 ft., swabbed dry through tubing, treated with 1,000 gal. of acid, crew was swabbing and cleaning out. Canadian Oil Co.'s No. 1 Goff, E½ NW SE Section 16-5n-12w, shot with 10 qt. at 960-68 ft., drilling at 1,050 ft.

In Jasper County Mammoth Producing & Refining Co.'s No. 2 Johnoff, SE SE SE Section 24-5n-9e, set 10-in. casing at 499 ft., drilling at 2,110 ft.

In Fayette County Texas Co.'s No. 1 Grey, NW SE NE Section 1-5n-2e, a location. Texas' No. 1 Pruitt, NW NW NE Section 1-5n-2e, Benoist sand at 1,769 ft., total depth 1,789 ft., some water in the Benoist; shut down for orders.

In Madison County R. J. Jennings' No. 1 Mossiman, SE SW NW Section 22-4n-5w, drilling below 1,000 ft.

In Clay County Pure Oil Co.'s No. 1 Ross Travis, CE½ SE NW Section 32-3n-8e, total depth 3,068 ft., plugged back to 3,036 ft. and treated with 5,000 gal. of acid; swabbed 38 bbl. of fluid in 24 hours, 50 per cent water, testing.

In Clinton County H. Hubbard's No. 1 DuComb, SW NW SE Section 23-3n-1w, total depth 1,537 ft., shut down for orders. Aux Vases sand was topped at 1,536 ft.

In Lawrence County W. L. Dorsey's No. 1 E. Vandermost, SE SW NW Section 2-2n-12w, running 10-in. casing, total depth 830 ft.

In Clinton County O. W. Burroughs' No. 1 Klein, SE SE SE Section 35-2n-2w, Benoist sand at 1,372-80 ft., shut down for orders. M. C. Trumbull's No. 1 Ackman, SE SW SE Section 22-2n-3w, total depth 1,240 ft., underreaming 8-in. casing at 1,179 ft. Snell & Goldschmidt's No. 1 Schaefer, SW NE NW Section 33-2n-3w, drilling at 1,485 ft. M. C. Trumbull and others' No. 1 Peters, SW cor. SE SE Section 33-2n-4w, drilling at 1,575 ft.

In Wabash County Riddle and others' No. 1 Seibert, flowed 250 bbl. of oil per day for 4 days and then died. The crew was cleaning out preparatory to acidizing.

In Wayne County Pure Oil Co.'s deep test No. 3 Bullington, CE½ SE NE Section 27-1n-7e, was drilling at 5,670 ft. It is a Peters sand test.

Southwest Texas Fields

(Continued from Page 223)

ft., 252 bbl., pumping. Elm Creek field: E. A. Weyel's No. 4 Schaffl, 773 ft., dry and abandoned.

Jim Hogg County

Colorado field: Colorado Octane Co.'s No. 3-B Trevino, sand 3,002-15 ft., 40 bbl., 5/32-in. choke. Humble Oil & Refining Co.'s No. 5 King, 3,055 ft., 47 bbl., ⅜-in. choke. Kelsey field: Humble Oil & Refining Co.'s No. 58 McGill, 4,746 ft., 77 bbl., 7/64-in. choke. Humble Oil & Refining Co.'s No. 62 McGill, 4,754 ft., 79 bbl., 9/64-in. choke.

Jim Wells County

Ben Bolt field: Bridwell Oil Co.'s No. 6-A Hoffman, perforated casing 5,228-34 ft., 190 bbl., 7/32-in. choke. Magnolia City field: V. J. Meyer and others' No. 5 Reynolds, 5,738 ft., 56 bbl., jetting.

Live Oak County

White Creek field: Clark Drilling Co.'s No. 1 Adams, 1,510 ft., dry and abandoned.

McMullen County

South Calliham field: Marion Production Co.'s No. 1 Jungman, 1,347 ft., dry and abandoned.

Medina County

Adams field: Carl and Flinders' No. 1-A Adams, 366 ft., dry and abandoned.

Nueces County

Clara Driscoll field: R. B. Bryant's No. 2 Rogers, perforated casing 5,530-40 ft., 62 bbl., jetting. Pan American Production Co.'s No. 3 Driscoll, perforated casing 3,809-17 ft., 67 bbl., 5/32-in. choke North Luby field: Seaboard Oil Co.'s No. 5-A La Prelle, perforated casing 4,356-58 ft., 76 bbl., 60 per cent salt water, pumping.

Milam County

Rockdale field: H. H. Coffield's No. 3 Niehaus-Isaacs, sand 720-60 ft., 14 bbl., pumping. Walter Watson's No. 1 Wallis, 547 ft., dry and abandoned.

Refugio County

Tomoconnor field: Quintana Petroleum Corp.'s No. 35 Heard, perforated casing 5,872-80 ft., 617 bbl., ¼-in. choke.

San Patricio County

East White Point field: Sinclair Prairie Oil Co.'s No. 8 State, perforated casing 5,600-16 ft., 84 bbl., 14 hours, ⅛-in. choke.

Starr County

Rincon field: W. R. Davis' No. 12-B Slick, perforated casing 4,239-51 ft., 336 bbl., ¼-in. choke.

Webb County

Adami field: Bridwell Employes' No. 5-A Adami, sand 992-99 ft., 17 bbl. oil and 35 bbl. water, pumping. Bridwell Employes Oil Co.'s No. 6-A Adami, sand 980-95 ft., 25 bbl., pumping. Harry Poe's No. 4 Adami, sand 960-70 ft., 41 bbl., pumping. Bruni field: Tide Water Associated Oil Co.'s No. 7 Bruni, perforated casing 5,620-30 ft., 6 bbl. oil and 6 bbl. b.s. and w., ¼-in. choke.

Williamson County

Byersville field: Charles Rosener's No. 1 Zieschang, 1,032 ft., dry and abandoned.

Zapata County

Comitas field: J. P. Nash's No. 35 Haynes, 1,157 ft., 15 bbl. of oil and 3 bbl. of water, pumping. Escobas field: Kleiner and Hill's No. 19 Trevino, sand 1,220-63 ft., 9 bbl., pumping. Buffalo Oil Co.'s No. 10-C Hinnant, sand 1,973-89 ft., 92 bbl., pumping. Mirando Valley field: Buffalo Oil Co.'s No. 12-C Hinnant, sand 1,974-82 ft., 76 bbl., pumping. Interstate Minerals, Inc.'s No. 35 Lopez, sand 1,710-33 ft., 53 bbl., pumping.

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California Field Report

3 Wells Drilling to Ninth Zone in Montebello Field

By

L. P. STOCKMAN

LOS ANGELES, Calif., Mar. 25.—Three operators have started drilling to the ninth zone in the Montebello field of Los Angeles Basin, and if this deepening work proceeds for another two weeks without interruption it may result in a general deepening campaign. Operators in this field are seriously perturbed by the stringent regulations imposed by the Superior Court in Los Angeles at the insistence of state officials who are demanding that all physical waste be eliminated. The present attempt to develop deeper production below the La Merced zone is being done in the hope that it will have a lower gas-oil ratio and thus permit a larger production of crude oil. Earlier in the past week a new order of the Superior Court went into effect, and as a consequence both gas and oil production will be reduced. The order cut the allowable production of gas to 80,000,000 cu. ft. from 100,000,000 cu. ft. daily, which will mean that the blow of gas to the air which has been averaging about 50,000,000 cu. ft. per day will be reduced to about 30,000,000 cu. ft. Operators, lessors, and other interested parties held an indignation meeting in the Montebello school last week and instructed a committee to take all steps necessary to rectify a condition that has been described as intolerable. Those present wanted to know why Montebello operators are being penalized, and the discussion tended to indicate that it was of a political matter. It seemed very pertinent to some that gas was being transmitted to Los Angeles Basin and the south from the San Joaquin Basin and Ventura County while gas was being blown into the air because of inadequate pipe-line facilities in the Montebello field. This procedure has, of course, puzzled operators for many years, and is due to a large extent to contracts made between the gas companies, which are public utilities, and the several operating oil companies. In the report of practically every investigating committee for 15 years or more there has always been a recommendation that some adjustment is necessary in the movement of natural gas so that an equitable taking will be possible. The California gas law has been held constitutional by the United States Supreme Court, but its enforcement has not always been equitable.

The Superior Court has held that it can not prohibit entirely the waste of gas in fairness to operators, even though such a thing can be done under existing statutes. It has been thought that the period of heavy gas production would be over before the close of July but each reduction in current production of gas prolongs the period of flush production so that the La Merced zone may still be in a flush state for several months more.

Current production of leading California fields follows:

	Bbl.
Wilmington	85,185
Midway-Sunset	48,310
Kettleman Hills	46,825
Long Beach	44,515
Ventura Avenue	31,925
Huntington Beach	28,925
Santa Fe Springs	25,925
Montebello	20,400
Santa Maria Valley	10,860

Tide Water Associated Oil Co. has made a discovery of importance in the Aliso Canyon field in the San Fernando Valley section of Los Angeles County and this may lead to additional drilling in adjacent districts. Tide Water Associated Oil Co. has refused to release the customary well data. A few months ago, Tide Water Associated Oil Co. announced its intention of carrying No. 12 Porter down as a deep test and subsequently began actual work. This well is bottomed at 8,202 ft. but has been plugged back to 7,551 ft. It was the intention to carry it down into the Eocene for a conclusive test, but an excellent oil sand was found on the way down, and the company decided to make a formation test before proceeding further. This test resulted in a production of approximately 14,000,000 cu. ft. of gas and about 500 bbl. of high-gravity condensate. The oil sand being tested is believed to have been found between 7,000 ft. and 7,500 ft. and the performance of the well indicates that it is an accumulation of considerable importance. The zone is in either the middle or lower Miocene. Tide Water Associated Oil Co. discovered the Aliso Canyon field on October 25, 1938, when No. 1 Porter was brought in flowing 1,500 bbl. of 25.6-gravity oil per day from the Pliocene, with bottom of the hole at 5,363 ft. The company has since completed three excellent wells on the Porter lease and one on the San Fernando lease. Standard Oil Co. and Union Oil Co. each drilled a deep test close to holdings of Tide Water Associated Oil Co., but got dry holes and subsequently quitclaimed their respective leases. It is the general feeling of operators that Tide Water Associated Oil Co.'s No. 12 Porter has found a good zone and that it will be a better well than has been indicated.

Property owners in the vicinity of the San Fernando Reservoir area received a severe shock early in the week when Continental Oil Co. filed an abandonment notice on No. 1 Howell in Section 22-3-16. This wildcat was carried down to 4,280 ft. and tested dry. A poor oil sand and gray sand were cored at 1,680 to 1,686 ft., and a fair oil sand was found at 3,890-3,940 ft., but it did not yield fluid on the formation test. Top of the Saugus was cored at 1,862 ft., top of the Eocene was logged at 4,000 ft. and the well was bottomed in Eocene with a penetration of 260 ft. below the top.

Montebello

The three wells that started down to the ninth zone in the Montebello field last week were No. 1 Scheinik of Columbia Oil Co., No. 1 Foreman of Mono Oil Co., and No. 1 Montebello of United Montebello Oil Co. Ostensibly these wells were started down again to test out the lower part of the La Merced zone but they kept right on going and may core top of the ninth zone within a few days. The ninth zone was found productive in No. 30 La Merced of Union Oil Co., but it was not produced as this well was plugged back and completed in the La Merced zone. Franru Oil Co. completed No. 1 Condaffer at Spruce and Beverly Boulevard, flowing 240 bbl. of 35.5-gravity oil cutting 5 per cent, through a 20/64-in. bean, from the La Merced zone with bottom of the hole at 7,620 ft. It showed a high gas-oil ratio, and when the necessary reduction is made in gas production, there will be a noticeable decrease in oil production. No. 1 Condaffer was finished with a 7-in. water string cemented at 7,480 ft. and 163 ft. of 4½-in. liner landed on bottom and carrying 120-mesh perforations at 7,480-7,620 ft. and 7,614 ft. of 2⅛-in. tubing. Top of the La Merced zone was cored at 7,480 ft. At least 100 wells may be completed in the ninth zone if it comes up to expectations in the tests now drilling to it. No. 1 Scheinik of Columbia Oil Co. reached a depth of 8,154 ft. late in the week, but it was found barren and the company may plug back if nothing is found within another 150 ft. There is some question as to whether this well found the true ninth zone.

Wilmington

Two new Ranger zone wells were completed in the Wilmington field of Los Angeles Basin and both showed normal production. No. 26-B Harbor of Hancock Oil Co. was brought in flowing 355 bbl. of 19.9-gravity oil per day through two 48/64-in. beans from a depth of 4,073 ft. and No. 132 fee of Union Pacific Railroad Co. was finished flowing 470 bbl. of 16.9-gravity oil per day through a 38/64-in. bean from 3,567 ft. No. 26-B Harbor of Hancock was finished with an 11¾-in. water string cemented at 2,540 ft. and an 8⅝-in. oil string that was landed on bottom, cemented through perforations at 2,910 ft. and 3,465 ft. and perforated at 2,910-3,380 ft. and 3,465-4,073 ft. The well was gravel-packed at 2,910-3,380 ft. Production was brought in flowing through 4,013 ft. of 2⅛-in. tubing, which had a packer at 3,380 ft. No. 132 of Union Pacific was finished with a 10¾-in. water string cemented at 2,817 ft. and a 5½-in. liner that was landed at 3,564 ft. and cemented through perforations at 3,233 ft. Perforations were at 2,807-99 ft., 2,930-55 ft., 2,972-93 ft., 3,240-3,410 ft., 3,438-95 ft. and 3,504-4,564 ft. Continental Corp., (not Continental

TANKER SHIPMENTS FROM LOS ANGELES TO DOMESTIC AND FOREIGN PORTS

	March 17		March 10			
	Total this week	Daily average	Total last week	Daily average	This year to date	Same time last year
Intercoastal-domestic—						
Crude oil	.....	.....	.....	.....	.....	123,473
Fuel oil	.....	.....	.....	.....	152,798	324,591
Diesel and gas oil	.....	.....	.....	.....	.....	163,501
Gasoline	173,300	24,757	.....	.....	449,911	302,594
Kerosene	.....	.....	.....	.....	.....	56,940
Foreign exports—						
Crude oil	133,907	19,129	183,139	26,163	2,932,394	3,253,213
Fuel oil	62,145	8,879	282,714	40,388	1,597,318	1,474,112
Diesel and gas oil	137,728	19,675	174,402	24,915	1,472,619	894,991
Gasoline	94,634	13,519	.....	.....	1,053,403	1,791,294
Kerosene	88,649	12,664	.....	.....	275,845	234,151
Coastwise-domestic—						
Crude oil	150,439	21,491	150,136	21,448	2,277,487	2,162,842
Fuel oil	320,350	45,764	358,568	51,224	3,197,047	1,887,012
Diesel and gas oil	97,320	13,903	60,454	8,636	687,626	622,116
Gasoline	363,126	51,875	240,590	34,370	3,085,231	2,596,732
Kerosene	9,998	1,428	17,270	2,467	105,704	90,065

TANKER SHIPMENTS FROM SAN FRANCISCO TO DOMESTIC AND FOREIGN PORTS

Intercoastal-domestic—						
Fuel oil	.....	.....	.....	.....	68,740	.....
Diesel and gas oil	.....	.....	.....	.....	281,260	69,550
Asphalt	.....	.....	.....	.....	73,200	.....
Lubricants	.....	.....	.....	.....	7,606	4,170
Foreign exports—						
Crude oil	.....	.....	.....	.....	392,048	1,051,458
Fuel oil	18,990	2,713	.....	.....	194,145	407,380
Diesel and gas oil	20,148	2,878	.....	.....	373,356	316,127
Gasoline	.....	.....	.....	.....	405,541	770,023
Kerosene	.....	.....	.....	.....	84,359	262,209
Lubricants	.....	.....	.....	.....	79,651	88,188
Other finished oil	.....	.....	.....	.....	117	.....
Coastwise-domestic—						
Fuel oil	60,145	8,592	150,129	21,447	1,326,097	1,204,210
Diesel and gas oil	18,730	2,676	31,601	4,514	284,035	122,874
Gasoline	160,213	22,888	176,996	25,285	1,640,253	935,370
Kerosene	4,388	627	13,121	1,874	137,190	128,401

Oil Co.), which is developing the flood-control channel of the Los Angeles County Flood Control District has completed two good wells to date and should have another, No. 1 L.A.C.F.C., tanking oil within the next few days as the 8⅝-in. water string has been cemented at 2,542 ft. and the bit is again going ahead. This company is building two rigs and has location staked for another. These wells are drilled on a long narrow strip on the west bank of the control channel and the bottom of the holes are whipstocked beneath the main part of the channel. All wells finished are Ranger zone wells as the Terminal and Ford zones are cut off by a fault before they reach this property. Drilling operations appear to be increasing again in the Wilmington field and if further increases continue at the current rate this field will once again head the active drilling list.

Coalinga

Two wells were completed in the Northeast Coalinga field of Fresno County and two more should be ready for production tests within a few days. No. 28-17-B Southern Pacific Land of Amerada Petroleum Co. was brought in flowing at a daily rate of 3,500 bbl. of 27.9-gravity oil and 55,000,000 cu. ft. of gas per day from the Gatchell sand with bottom of the hole at 8,168 ft. and No. 46-18-B of Bandini Petroleum Co. was completed flowing 220 bbl. of clean 51.1-gravity oil and 5,500,000 cu. ft. of gas daily from the Gatchell sand with bottom of the hole at 9,614 ft., but plugged back to the completion depth, 7,985 tf. No. 28-17-B of Amerada Petroleum Co. was finished with a 7-in. water string cemented at 8,107 ft. Top of the Kreyenhagen was logged at 7,070 ft., top of the glauconite was cored at 8,058 ft. and top of the productive Gatchell sand at 8,107 ft. The bit was still in the pay when drilling was concluded. The crew was moved to No. 1-20-B Ewing in Section 20-19-16, and preparations made to begin immediate drilling.

The completion of No. 46-18-B of Bandini Petroleum Co. proved somewhat of a surprise, as this well found only a very thin streak of oil sand, and this accounts for the high gas-oil ratio and production of oil, which is more of a condensate than a normal crude. After failing to find a normal thickness of Gatchell oil sand during the course of work, Bandini officials ordered the well to be carried down for a deep test to determine the possibility of finding another productive horizon. The well was deepened to 9,614 ft. and failing to find production in the Cretaceous was plugged back to 7,985 ft. and a 7-in. liner landed at 7,940 ft. and cemented through perforations at that point. Inside the 7-in. liner the company landed a 4½-in. liner and cemented it at 7,823 ft., after which the hole was cleaned out to 7,836 ft. and gun-perforated. The large gas production indicates that it is coming from the uppermost member of the Gatchell zone, which contains a high-pressure gas-cap area. East of Bandini Petroleum's new well, Union Oil Co. is finishing No. 68-18 Cook in Section 18-19-16. The crew will be moved to No. 55-18 Cook, the rig for which has been erected. In the extreme southern end of the Southeast Coalinga field, Universal Consolidated Oil Co. found top of the Gatchell sand at 7,718 ft.; and after drilling ahead to 7,774 ft., the company ran in and cemented a 7-in. water string at 7,690 ft. The well is situated one location west of the company's outpost which was finished a few months ago on an 80-acre lease. Location has been staked for a third well, but no work will be done until after No. 61-24-C in Section 24-20-15 is on production.

Kettleman Hills

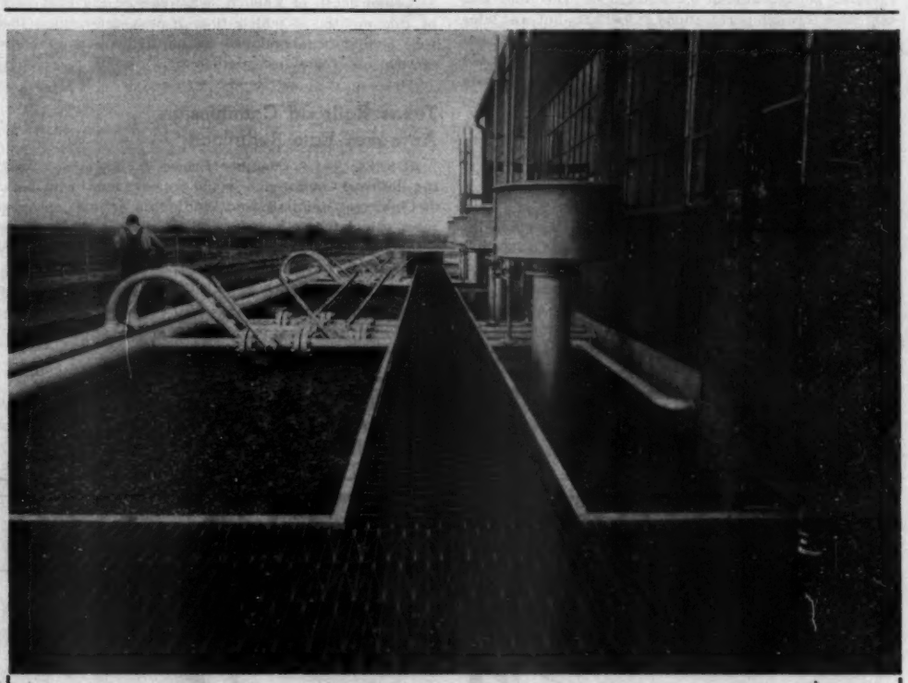
Kettleman North Dome Association (Kenda) completed another excellent well in the Kettleman North Dome field when No. 25-16-Q in Section 16-22-18 was brought in flowing 2,271 bbl. of 37.5-gravity oil and 2,877,000 cu. ft. of gas per day from the Temblor, with bottom of the hole at 7,800 ft. It was brought in flowing through a 160/64-in. bean and showed a tubing pressure of 250 lb. and a casing pressure of 350 lb. It was finished with an 8⅝-in. water string cemented at 6,980 ft. and 851 ft. of 6⅝-in. liner landed at 7,795 ft. and cemented through perforations at 7,331 ft. and 7,602 ft. Perforations opposite the oil sand were at intervals between 7,795 and 8,341 ft. A total of 6,013 ft. of 3-in. tubing was used to complete the subsurface pipe. Top of the Temblor was logged at 6,618 ft. Kenda is at present rotating ahead in two projected completions in the Eocene, and Standard Oil Co. is redrilling in another, No. 72-19-J, in Section 19-21-17. Union Oil Co. recently spudded in No. 9 King in Section 29-21-17 and will carry it down into the Eocene for completion. R. S. Lytle is planning to drill a deep Eocene test in the Felix area out on the north flank of the Kettleman structure in Section 35-21-17, but derrick is not yet on ground. Upon completion of present Eocene tests it is possible that operators will be able to get together and approve the unification plan submitted for consideration by Kenda a few months ago, or formulate a new plan along the same line. Due to the exceedingly high gas-oil ratio of Eocene wells, it is almost necessary to adopt some method whereby drilling operations can be kept down to minimum and production curtailed primarily in so far as gas is concerned. This highly productive zone offers an exceptionally outstanding opportunity for repressuring the Temblor, and Kenda has already started injecting Eocene gas into the upper zone.

Cole's Levee

Ohio Oil Co. completed No. 7-F Kern County land in the Cole's Levee field of Kern County, flowing 525 bbl. of 37.2-gravity oil and 1,230,000 cu. ft. of gas per day from a depth of 9,760 ft. It was brought in flowing through a 48/64-in. bean and showed a tubing pressure of 1,150 lb. and a casing pressure of 1,250 lb. The hole was carried down to 9,823 ft., but was plugged back. The hole was finished with a 7-in. water string cemented at 9,340 ft. and 429 ft. of 4½-in. liner landed at 9,758 ft. and carried 120-mesh perforations at 9,349-9,758 ft. and 9,738 ft. of 2½-in. tubing. Top of the productive Stevens zone was cored at 9,328 ft. This well has an elevation of 297 ft. above sea level and was drilled from spud to completion in 3 months and 2 days. In the Tupman field of Kern County, Richfield Oil Corp. made a formation test on No. 72-33-B Kern County land in Section 33-30-25 at 9,160 ft., and the well flowed at the rate of 2,250 bbl. per day. The company decided to drill ahead before completing, as the lower Stevens sand has been found highly productive.

San Joaquin Basin

In the Edison field of Kern County, A. S. Mayes recompleted No. 1 O.S.E. in Section 5-30-25, pumping 55 bbl. of 16.3-gravity oil cutting 4 per cent from 4,160 ft. This well, completed several years ago, was redrilled and deepened and finished with a 4½-in. liner which



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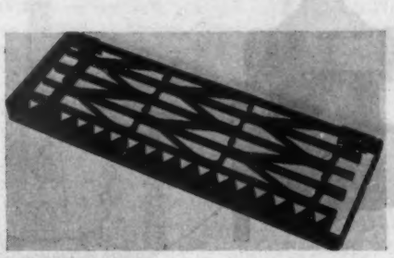

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froze at 4,145 ft. and was then cemented through perforations at 3,935 ft. Perforations in the 425 ft. of liner were at 3,935-4,145 ft. National Oil Co. completed No. 35 in the Midway-Sunset field in Section 35-32-23, pumping 25 bbl. of 14.2-gravity oil, cutting 3 per cent, from a depth of 1,520 ft. It was finished with an 8⅝-in. water string cemented at 1,080 ft. and 499 ft. of 6⅝-in. liner landed at 1,536 ft. and perforated at 1,075-1,520 ft. The hole had been drilled 1,588 ft., but was plugged back to 1,520 ft. due to bottom water.

Coastal District

After several months of hard work, Lloyd Corp. finally completed No. 4 Lloyd in the Ventura Avenue field, flowing 791 bbl. of 29.7-gravity oil and 2,000,000 cu. ft. of gas per day from 9,400 ft. It was brought in flowing through a 32/64-in. bean and showed a tubing pressure of 365 lb. and a casing pressure of 400 lb. It was drilled down to 10,135 ft., but plugged back to 9,400 ft. when the lower part of the hole was found wet. It was finished with a 7-in. water string cemented at 9,548 ft. and 660 ft. of 4¾-in. liner landed at 10,125 ft. and carrying perforations at 9,612-10,125 ft. The liner was cemented through perforations at 9,612 ft., but was later abandoned when the lower zones proved to be wet, and a plug was set at 9,400 ft. The 7-in. was gun-perforated at 8,400-20 ft., and 8,200 ft. of 2½-in. tubing run into the hole. California Alliance Petroleum Co. has found the 57 zone in No. 2 Hartman to consist principally of gray sand with streaks of oil sand, and at 8,770 ft. the outlook is not bright for a successful completion.

Los Angeles Basin

Union Oil Co., in the Dominguez field of Los Angeles Basin, completed No. 75 Callender, good for 2,280 bbl. of clean 32.1-gravity oil and 750,000 cu. ft. of gas per day from the eighth Callender zone with bottom of the hole at 7,396 ft. It is located just north of the eucalyptus grove. The well finished with a 7-in. water string cemented at 6,985 ft. and 523 ft. of 5½-in. liner landed at 7,393 ft. and carrying perforations at 6,895-7,393 ft. and 7,330 ft. of 2½-in. tubing. Up to date no one appears very enxious to contribute any dry-hole money to finance deepening operations on No. 1 Grant of Pongratz Petroleum Co., which was suspended about 2 weeks ago after finding the eighth Callender zone wet. This operator would like to have some contributions in order to make a deep test and has not yet removed drill pipe from the rig. In the Torrance field, Chanslor-Canfield Miday Oil Co. has recompleted No. 71 Torrance pumping 225 bbl. of relatively clean 26.7-gravity oil per day after the hole was reconditioned at 5,028 ft. and deepened from the upper zone.

Alaska Test Abandoned; No Showing at 7,596 Ft.

Abandonment is now under way of the joint drilling operations in Alaska, undertaken in 1937 by Tide Water Associated Oil Co., Union Oil Co. of California, and Standard Oil Co. of California. This venture drilled No. 1 Grammer oil well in the Bear Creek-Salmon Creek area on the Alaskan Peninsula, west of Shelikoff Strait. It was spudded in July 1938 following many months of preliminary effort in transporting materials and erecting camp. A shutdown was forced in the first winter season due to high winds and rain and snow.

A final depth of 7,596 ft. was reached the first part of this month, at which time it was determined the well should be abandoned as no indications of commercial oil or gas had been found.

Texas Railroad Commission Approves Rate Reduction

AUSTIN, Tex. — Member Ernest O. Thompson said the Railroad Commission would approve city ordinances of Childress, Memphis, and Wellington setting new gas rates calculated to save consumers in the three cities a total of $20,000 annually.

The ordinances were drawn by agreement with United Gas Co., which supplies the three communities, and require a net reduction of 11 cents per 1,000 cu. ft. of gas.

Rocky Mountain Area

(Continued from Page 226)

offered at auction by E. R. Fryer, general superintendent, at Window Rock, Ariz., on April 16. The lease is offered for a cash bonus in addition to the stipulated royalties and rentals of $1.25 per acre per annum.

Angel Peak Oil Co.'s No. 9-B Government, C NE NW Section 24-28n-11w, Kutz Canon gas field, was completed at 1,897 ft. in the Picture Cliff formation for 4,500,000 cu. ft. of gas per day. It is the largest well so far completed in the field. It has been hooked up with the line and is on production.

Angel Peak Oil Co.'s No. 10-B, C NW SE Sec. 24-28n-11w. Spdg.; (first report).
Claude Carroll's No. 1 Cornell, C SE NE Sec. 11-29n-12w. M.I.C.T. for test to gas sd.; (first report).
Kutz Deep Test, Inc.'s No. 1 Govt., C NW NW Sec. 28-28n-10w. S.D. 800 ft.
Continental Oil Co.'s No. 100 Rattlesnake, SE NW NE Sec. 2-29n-19w. T.D. 7,407 ft.; tstg.

San Miguel County

Ben E. Keith's No. 1-X McCune, SW SE SW Section 32-16n-12e, was abandoned in granite at 1,822 ft.

Socorro County

Joiner Oil Corp.'s No. 1 Belen Grant, SE NW Sec. 16-3n-1e. Cmtd. 10-in. at 585 ft. and S.D.

Valencia County

C. A. Grober et al's No. 1 Fuqua, NE NE Sec. 19-5n-3e. T.D. 3,850 ft.; prep. to run 7-in.

Michigan Fields

(Continued from Page 222)

No. 1 Snip & Cook, SE NE NE Section 23, produced 75 bbl. a day after being acid-treated total depth is 1,873 ft. After acid treatment, H. C. Williams' No. 1 Samuel H. Bryan, SW SW NW Section 25, was producing 85 bbl. a day from 1,878 ft., and at the same depth, Edward B. Strom, trustee's No. 3 John Masterson, SW NE SE Section 23, was getting 50 bbl. a day, after acid treatment.

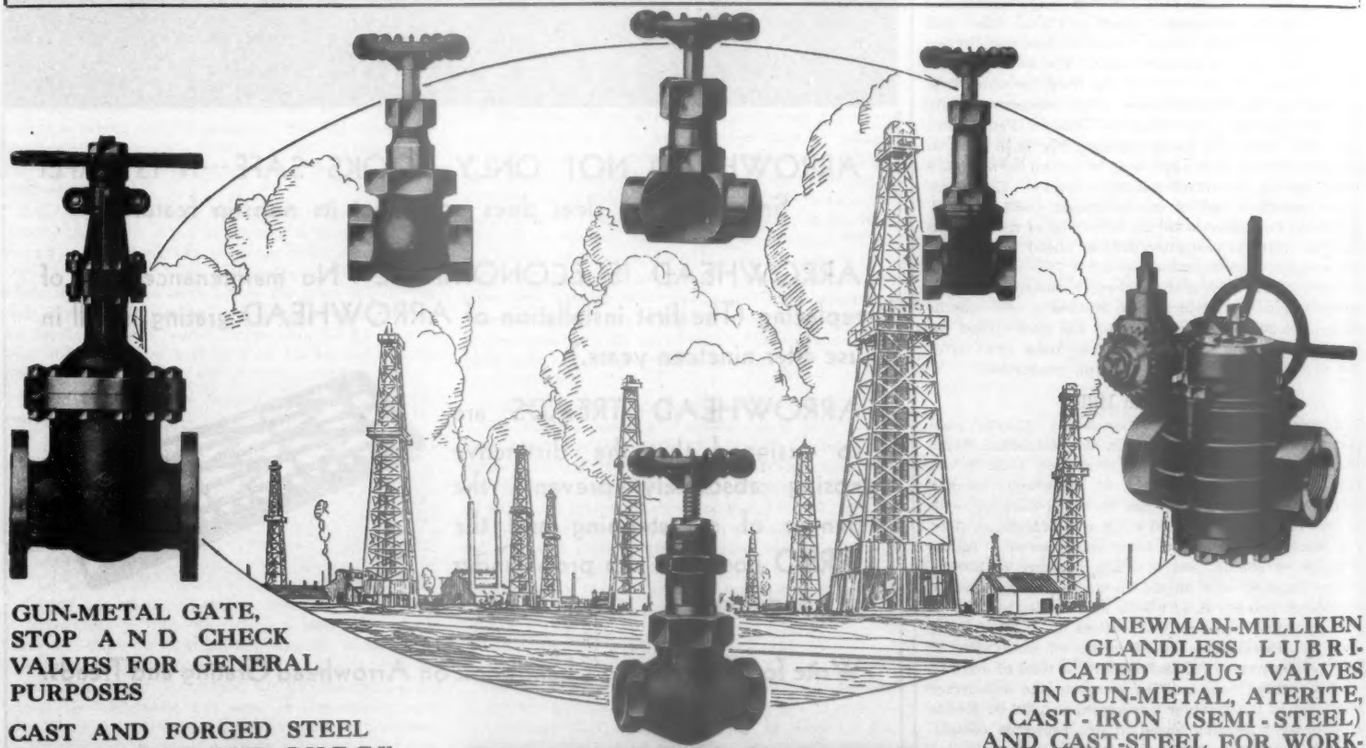
Shiawassee County

Antrim Township (5n-3e)—VanLew Petroleum Syndicate's No. 1 L. S. Willett, SE NE SW Section 28, was dry and abandoned at 2,072 ft.

Van Buren County

Columbia Township (1s-15w)—W. A. Milliken's No. 1 K. Kotelensky, SW SE SW, drilled to 1,116 ft., was dry and abandoned, as was H. B. Cannon, trustee's No. 1 William Bellerbeck, SE SE SE Section 4, at 1,155 ft.

VALVES FOR THE OIL INDUSTRY



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North and East Texas

By
D. H. STORMONT

Vast Leasing Campaign in Four North Texas Counties

WICHITA FALLS, Tex., Mar. 25.—The greatest leasing campaign in Texas since the days of the East Texas field, one in which the major companies are taking as active a part as the independent operators, is gaining momentum daily throughout northern Texas. With operators being drawn from all parts of Texas and Oklahoma, leasing has spread southward from Montague and Clay counties to northern Jack and Wise counties. Tens of thousands of acres have changed hands in the past week for prices ranging from $2 and $3 for outlying wildcat areage to $400 and $500 per acre for close-in tracts.

Eight or ten deep-wildcat locations were made in Montague County during the past week and innumerable drilling blocks are being readied for immediate testing. With leasing centered 2 weeks ago in the southern and central part of Montague County, the discovery of oil at an old, long-capped wildcat test just east of Henrietta in central Clay County, drew a major part of the play to the entire county. The completion of large blocks and the staking of wildcat locations in extreme southern Montague County has pushed the leasing southward to include practically all of Wise County, a long-dormant area for wildcatting.

Map companies and lease buyers are scarcely able to keep pace with the rapid sale of leases. Practically every major company has three or four or more land men buying any and all available tracts. Even a brief survey or synopsis of the major lease deals would be impossible, many of the buyers acquiring tracts only to resell them the following day.

Geologists have made no assertions as to the magnitude of the structural conditions precipitating the play, but the wildcatters' objectives are the lower Strawn and the Bend series members, lying conformably and unconformably upon older beds at the mergence of the Bend arch and the Red River uplift.

Montague County's most active leasing started in the central part and ½ mile west of Bonita several weeks ago when Sinclair Prairie Oil Co. brought in No. 1 Howard as a discovery well from the Bend conglomerate. This discovery was closely followed by W. Bland Omohundro's No. 1 Seay, about 2 miles south of the town of Ringgold in the extreme western part of the county and about ½ mile from the Clay County line. Omohundro's well was gaged last week for 240 bbl. of 47.8-gravity oil in 3 hours from the Bend conglomerate, drilled from 5,690 to 5,704 ft. The Sinclair Prairie discovery well drilled its pay from 5,241 to 5,249 ft. or about 450 ft. higher than the Omohundro field opener. Geologists have not disclosed whether or not the producing horizons are at all correlative, but it is believed that the lower Bend formations dip in a westerly direction and tend to pinch out against the Red River uplift in a northeasterly direction.

New Wildcats

Oppman & Holtsclaw, of Pearson, Okla., have staked location for No. 1 P. J. Blackburn estate, a 4,900-ft. wildcat, 1,400 ft. from the west line and 467 ft. from the south line of Block 1, S.A.&M.G. Survey, 3 miles southeast of the town of Montague. The location is 9,000 ft. northwest of Walter K. Jones' No. 1 Johnson, Block 5, E.T. Survey, which was abandoned several weeks ago at 5,000 ft. after drilling showings of oil in the Strawn zone.

Two miles north of the Benton & Holmes field, Seitz, Comegys & Seitz, Wichita Falls, made location for No. 1 King estate, 1,903 ft. from the west line and 330 ft. from the north line of SE¼ E. B. Wooten Survey, Abstract 80.

The Benton & Holmes field, which is producing from a granite-wash horizon of Strawn age, has been given a 5,000-ft. operation. Walter Gant, Ardmore, Okla., started No. 1 J. W. Robinson, SW Section 55, M.E.P.&P. Survey, ½ mile northwest of the discovery well.

Ramsey Petroleum Co.'s No. 1 Magee, Davis Survey, ½ mile south of the Montague townsite, was spudded. No. 1 Magee has been contracted by W. B. Omohundro, who drilled the discovery well south of Ringgold.

Another deep wildcat for Montague County and about 6 miles southeast of the Omohundro discovery well is W. H. Peckham and others' No. 1 Dr. Lawson, on a block of 2,000 acres, in the N. Kimbro Survey, Abstract 405.

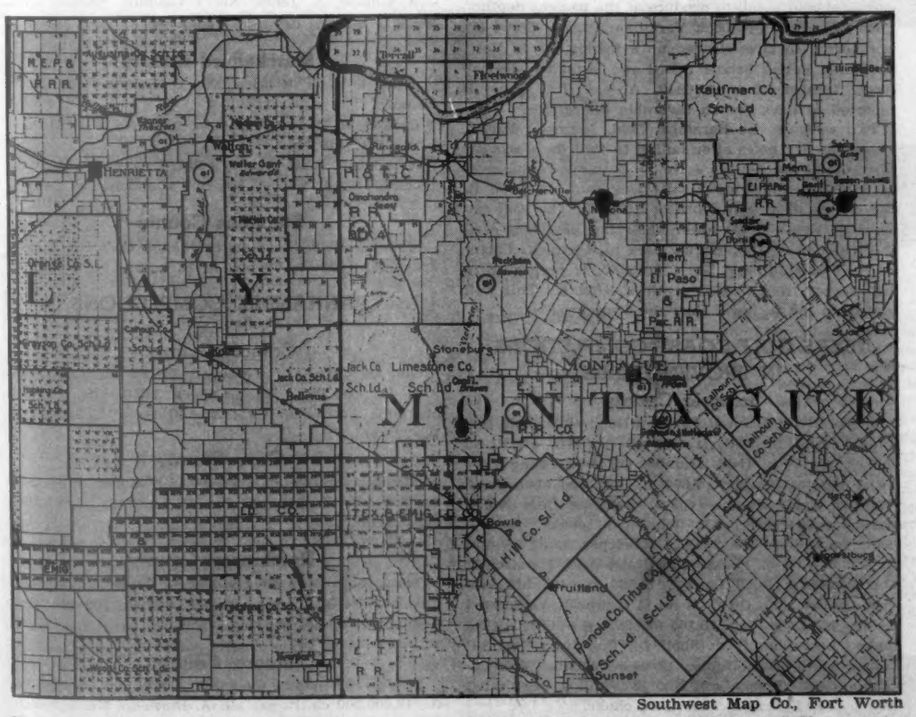
A large number of the recently acquired drilling blocks carry obligations to start tests in the near future. R. O. Harvey's large block just west of Stoneburg and several miles south of the Omohundro discovery well has a drilling obligation, but the location has not yet been announced. J. S. Bridwell's block south of Belcherville is to be tested within a few weeks according to reports.

Clay County

Early in the week the old long-capped Walter Gant's No. 1 Edwards, S. C. Beldon Survey, Abstract 12, about midway between Henrietta and Ringgold, a well abandoned as a dry hole in 1938, was opened and slopped oil over the casing. The wildcat is bottomed at 6,345 ft., in lime, and 7-in. casing is cemented at 5,995 ft. The operator does not know from which level the oil is coming, but a spudder is being moved in for cleaning out and testing.

Closely following the discovery of oil in this old well, two new locations were announced for the northern half of the county. On a block of 5,500 acres 2½ miles northwest of the Gant well, Carlos Wagner, Duncan, Okla., has spudded No. 1 L. C. Thaxton, 3,630 ft. from the south line and 330 ft. from the east line of the 301-acre farm, W. C. Donley Survey, Abstract 129, Section 4. It is projected to 5,000 ft. and is to be drilled with rotary.

The first deep test for the old Petrolia pool of northern Clay County was staked in the past week. Alexander Goldsmith, Wichita Falls, will drill No. 1 Republic Natural Gas Co., a proposed 4,500-ft. rotary wildcat 312 ft. from the north line and 495 ft. from the west line of Block 14, Parker County School Lands Survey, approximately 1 mile south of the town of Petrolia.



Southwest Map Co., Fort Worth

The greatest lease play in Texas since the days of the East Texas field is what Montague and Clay counties is receiving at the present time. Wildcats have either been staked or planned for many areas in the two counties. The play has pushed almost to the Red River on the north and to central Wise County on the south

NORTH TEXAS COMPLETIONS

Archer County

Deep Oil and R. G. Drilling Co.'s No. 4 J. A. Little, 4,309-61 ft., 1,400 bbl. Hammon, Hanlon-Buchanan, Inc.'s No. 9 W. P. Ferguson B, 3,810-3,920 ft., 520 bbl. Helmerich & Payne and Blackwell's No. 10 L. F. Wilson, 4,342-70 ft., 1,200 bbl. Rancho Oil Co.'s No. 17 H. O. Prideaux, 615-66 ft., 10 bbl. J. D. Thweatt and others' No. 3 R. O. Prideaux, abandoned location.

Clay County

C. L. Ganaway's No. 1 Saner and others, 227-39 ft., 10 bbl. D. A. Kahn, trustee's No. 1 Ray Fultz, 1,370 ft., dry. J. I. Staley and others' No. 1 W. N. C. Phariss, 1,469 ft., dry.

Cooke County

Big Indian Oil & Drilling Co.'s No. 1 M. P. Morton, 2,501 ft., dry. C. & L. Oil Co.'s No. 14 J. J. Perkins, 749-66 ft., 10 bbl. Cox & Hamon's No. 5 K New "Old," 4,960-83 ft., 404 bbl. Magnolia Petroleum Co.'s No. 2 S. L. Ramsey, 4,878-87 ft., 280 bbl. E. F. Peters' No. 1 Frank

Klement, 2,542 ft., dry. Sun Oil Co.'s No. 2 Fred Snuggs, 4,903-40 ft., 295 bbl.

Jack County

J. D. Thweatt and others' No. 4 R. O. Prideaux, abandoned location.

Montague County

W. B. Omohundro's No. 1 W. D. Seay, 5,689-5,704 ft., 1,920 bbl., wildcat.

Wichita County

B. C. E. Development Co.'s No. 1 J. N. George, 1,450-69 ft., 110 bbl. Deep Oil Development Co.'s No. 22 Munger A, 3,745-3,880 ft., 560 bbl. E. C. Oil Co.'s No. 4 Anna Mangold A, 3,770-3,856 ft., 542 bbl. W. H. Hammon's No. 1 S. H. McCarty A, 3,765-3,880 ft., 900 bbl. Hammon, Hanlon-Buchanan, Inc.'s No. 3 W. H. Hammon, 3,953-4,046 ft., 1,300 bbl. L. V. Hull's No. 7 E. Daume, 657-97 ft., 55 bbl. Mul-Berry Oil Co.'s No. 6 R. J. Bradley, 3,807-3,912 ft., 600 bbl. Southport Petroleum Corp.'s No. 14-A State land, 3,860-4,008 ft., 450 bbl.

Wilbarger County

King Oil Co.'s No. 25-A W. T. Waggoner estate C, 1,167 ft., dry. Lawson & Leavell's No. 3 W. T. Waggoner U, 1,383 ft., dry.

Young County

P. C. Brashear and others' No. 1 J. K. Jeffery, 826 ft., dry. H. Craig's No. 1 Ben Schlegel, 1,124-36 ft., 50 bbl. Charles B. King's No. 12 C. W. Johnson, 645 ft., dry. Moran and others' No. 19 W. B. Howard, 894-913 ft., 20 bbl. Travis Oil Corp.'s No. 3 Mrs. D. F. Ford, 2,735-2,802 ft., 520 bbl. James T. Touchy, trustee, and others' No. 1 S. P. Ackers, 3,331-60 ft., 14,000,000 cu. ft. gas.

EASTERN TEXAS

DALLAS, Tex., Mar. 25.—The staking of four new wildcat locations in eastern Texas drew attention in the district again to the Woodbine sand, the deep Trinity play having noticeably subsided. New tests were staked in Falls, Kaufman, Navarro, and Van Zandt counties, the latter three being Woodbine sand tests while the Falls County test is to the Buda lime. In Kaufman County Groginske & Gannon, Fort Worth, have located their No. 1 Eli H. Brown, Jr., a Woodbine sand test to be drilled 330 ft. from the east line and 2,310 ft. from the north line of a 962-acre tract in the M. Reynolds Survey, 6 miles southwest of the town of Kaufman.

Navarro County's wildcat is M. M. Johnson's No. 1 Flemming, J. Smith Survey, 5 miles southeast of Corsicana. In Van Zandt County E. L. Shackelford, Dallas, located No. 1 E. J. Combs, J. Wright Survey, 3½ miles northwest of Grand Saline. Materials are being moved in for immediate drilling of the latter test.

Falls County's shallow test will be drilled by M. Hays as his No. 1 A. N. Taylor, F. Mahhan Survey, 1 mile northeast of Lott.

Deep activity throughout the district is at a low point, Camp County's indicated field opener is still shut down for title work, and Chapel Hill's south outpost continues to test. The Camp County test by H. S. Moss on the Joe Venters lands, Wright Survey, 3 miles southeast of Leesburg, is shut down at a total depth of 8,087 ft. with plug undrilled. Casing was cemented above shows of oil believed to be in the Pettit section.

Chapel Hill's outpost to the south, Sun Oil Co.'s No. 1 Huddle, is cleaning out after the hole bridged. Total depth is 8,226 ft. and casing is set at 7,870 ft.

EAST TEXAS FIELD COMPLETIONS

(One-hour gages)

Gregg County—Longview Area

Coastal Development Co.'s No. 18 J. J. Fluellan, 3,655-68 ft., 40 bbl. Coastal Development Co.'s No. 5 Bob Wood, 3,523-50 ft., 40 bbl. L. S. Flannery's No. 2-A W. H. York, 3,512-52 ft., 50 bbl.

Gregg County—Kilgore Area

W. B. Pearce's No. 4 J. B. Borders, 3,536-59 ft., 20 bbl.

Rusk County—Joiner Area

Sam Letwin's No. 7 G. W. Eaton, 3,753-54 ft., 20 bbl.

Upshur County—Longview Area

B. F. Phillips' No. 1 C. B. Everrett, 3,651-52 ft., 20 bbl.

EAST CENTRAL TEXAS COMPLETIONS

(24-hour gages)

Falls County

A wildcat, R. D. Salisbury's No. 1 W. M. Shankle, J. A. Manchaca Survey, 1½ miles northeast of Chilton, dry and abandoned at 1,274 ft.

Franklin County

Talco field: Stroube-Stroube's No. 6 Norma-Prince, 4,245-75 ft., 570 bbl.

Houston County

Grapeland field: Grapeland Oil Co.'s No. 1 J. M. Moore, 5,954-84 ft., 67,000,000 cu. ft. of gas.

Navarro Crossing field: Humble Oil & Refining Co.'s No. 2 M. B. Hill, 5,880-84 ft., 62 bbl.

Titus County

Talco field: V. A. Hughes' No. 4 A. V. Flannagan, 4,304-45 ft., 500 bbl.

Trinity County

A wildcat, Davis Co.'s No. 1 Long Leaf Lumber Co., A. Henry Survey, 5 miles south of Lovelady, dry and abandoned at 2,514 ft.

Gulf Coast Fields

(Continued from Page 211)

In the West Hackberry field, Cameron Parish, Stanolind Oil & Gas Co.'s No. 21 School Board, Section 16-12s-10w, logged oil in a deep sand and is coring below 9,340 ft. Sand showing oil was recovered in cores at 9,253-99 ft. and at 9,308-13 ft. This is the deepest sand yet found around the flank of the structure.

Plymouth Oil Co.'s No. 1 McHugh, the discovery well of the Bayou Pigeon prospect, Iberia Parish, is flowing 15 bbl. of 35.6-gravity oil per hour through a 3/16-in. choke. The well was completed the previous week at 8,052-72 ft. This is the first field to be opened in South Louisiana by the company.

In Orleans Parish W. T. Burton was testing No. 1 L.&N.R.R., Section 18-11s-15e. The well was drilled to a total depth of 10,405 ft., and is being tested through perforated casing at 9,010-18 ft.

Texas Co.'s No. 1 State, West Cote Blanche area, St. Mary Parish, is being tested through perforated casing at 3,154-64 ft. Casing, 9⅝-in., was recently cemented at 8,685 ft., and the well is expected to be drilled deeper should it fail to produce at the present depth.

On the Erath prospect, Vermilion Parish, Texas Co. is reported to have cleaned up a fishing job in No. 1 Vermilion Parish School Board and is taking sidewall cores. Total depth is 11,762 ft. An electrical survey is reported to have shown favorable indications.

Two wells in the Barataria field, Jefferson Parish, loomed as dry holes after failing to find the discovery pay. California Oil Co.'s No. 1 Zeringue-Community, Section 2-16s-23e, topped salt-water sand at 8,256 ft. and drilled to a total depth of 8,275 ft. The well ran approximately 50 ft. lower than the discovery well and the company is plugging back to sidetrack. Carter & Perrin and others' No. 1 Ruttley, is preparing to drill deeper from a total depth of 8,621 ft. This well correlated 120 ft. lower than the discovery.

TEXAS GULF COAST COMPLETIONS IN PROVEN FIELDS

Brazoria County

Anchor field: Glenn McCarthy's No. 1 Galaznick, perforated casing 10,480-85 ft., 496 bbl., 13/64-in. and ¼-in. chokes. Danbury field: Humble Oil & Refining Co.'s No. 1 Bassett Blackley, 7,600 ft., dry and abandoned. Hastings field: Humble Oil & Refining Co.'s No. 2 Masterson, 6,089 ft., 302 bbl., ¼-in. choke. Manvel field: Texas Co.'s No. 23 W. T. Belcher, sand 5,650-70 ft., 533 bbl., ¼-in. choke. Old Ocean field: Harrison & Abercrombie's No. 3 Larsen, 10,536 ft., 495 bbl., various chokes. Sun Oil Co.'s No. 4 Campbell, perforated casing 10,078-88 ft.; 10,105-40 ft., 414 bbl., ¼-in. choke. Lockridge field: Shell Oil Co., Inc.'s No. 8-B Ramsey, 6,407 ft., 257 bbl., 12/64-in. choke. West Columbia field: Texas Co.'s No. 13 Phillips, perforated casing 5,540-70 ft., 538 bbl., ¼-in. choke.

Fort Bend County

Thompson field: Humble Oil & Refining Co.'s No. 29 Davis, sand 4,318-45 ft., 122 bbl., ⅛-in. choke. Quintana Petroleum Corp.'s No. 6-B Wolters, perforated casing 5,376-84 ft., 113 bbl., ⅛-in. choke.

Galveston County

Capien field: Sun Oil Co.'s No. 3 Zinn and Forman, perforated casing 7,355-70 ft., 188 bbl., ⅛-in. choke.

Harris County

Eureka field: John Bybee and others' No. 1 fee, sand 7,702-30 ft., 272 bbl., ¼-in. choke. Fairbanks field: Amerada Petroleum Corp.'s No. 19 Foley, perforated casing 6,840-49 ft., 139 bbl., ⅛-in. choke. Tomball field: Humble Oil & Refining Co.'s No. 1-C Juergens, 5,568 ft., 24 bbl., ¼-in. choke.

Jackson County

West Ranch field: Superior Oil Co.'s No. 2 Drummond, perforated casing 5,580-98 ft., 595 bbl., ¼-in. choke. Magnolia Petroleum Co.'s No. 52-A West, perforated casing 5,582-88 ft., 397 bbl., ¼-in. choke. Magnolia Petroleum Co.'s No. 53-A West, perforated casing 5,121-29 ft., 504 bbl., ¼-in. choke. Magnolia Petroleum Co.'s No. 50-A West, perforated casing 5,587-94 ft., 431 bbl., ¼-in. choke. Humble Oil & Refining Co.'s No. 1 Menefee Lake, 5,536 ft., 528 bbl., ¼-in. choke. Lonnie Glasscock's No. 1-A Drummond, perforated casing 5,790-93 ft., 185 bbl., ¼-in. choke.

Liberty County

Hardin field: Atlantic Refining Co.'s No. 2-A Humphrey, sand 7,548-70 ft., 88 bbl., ⅛-in. choke. J. R. Nowery's No. 2 Humphrey, 7,626 ft., 66 bbl. 7/64-in. choke.

Orange County

Port Neches field: Texas Co.'s No. 10 Stark, sand 5,946-72 ft., 266 bbl., ¼-in. choke.

Polk County

Segno field: J. K. Dorrance's No. 5-A Wing, sand 8,126-45 ft., 366 bbl., ¼-in. choke.

Wharton County

Withers field: Showers & Moncrief's No. 1 Halamicek, 6,075 ft., dry and abandoned. Texas Co.'s No. 49-B Pierce, 5,550 ft., 50 bbl., gas lift. Texas Co.'s No. 69-C Pierce, 5,398 ft., 98 bbl., ⅛-in. choke.

West Texas Fields

(Continued from Page 219)

Palo Pinto County

A wildcat, S. Jones' No. 1 Gauldin, Section 1,742, T.E.&L. Survey, dry and abandoned at 1,546 ft.

Shackelford County

Sedwick field: Roark's No. 1 Hickman, 661-63 ft., 29 bbl.

Cook field: Roeser-Pendleton, Inc.'s No. 6-B-113 Cook, 1,553-61 ft., 38 bbl.

A wildcat, Jones-Stasney's No. 1 Davis, Section 50, Block 13, T.&P. Survey, dry and abandoned at 1,814 ft.

Stephens County

Stribling field: Stedman Petroleum Co.'s No. 1 Powers, 3,542-3,627 ft., 77 bbl. in 18 hours.

PANHANDLE COMPLETIONS

(24-hour gages)

Carson County

Gulf Oil Corp. No. 27 Cooper, 3,075-3,135 ft., 155 bbl. Shell Oil Co., Inc.'s No. 8 Cooper, 3,050-95 ft., 304 bbl. Magnolia Petroleum Co.'s No. 73 fee 244, 3,095-3,175 ft., 221 bbl.

Gray County

Magnolia Petroleum Co.'s No. 4-B Morse, 2,495-2,560 ft., 308 bbl. Texas Co.'s No. 32 Saunders, 2,895-2,965 ft., 527 bbl.

Hutchinson County

Texas Co.'s No. 20 Pond, 2,875-2,945 ft., 756 bbl. Texas Co.'s No. 21 Pond, 2,880-2,940 ft., 762 bbl. Clay Brothers' No. 5-A Herring, 3,200,000 cu. ft. gas daily.

Moore County

Phillips Petroleum Co.'s No. 1 Spurlock, 2,920-3,123 ft., 12,600,000 cu. ft. gas. R. A. Burnett's No. 1 Powell, 2,930-3,140 ft., 16,518,000 cu. ft. gas. Phillips Petroleum Co.'s No. 1 Noel McDade, 2,915-3,120 ft., 10,000,000 cu. ft. gas.

Canadian Fields

Completions and Operations in Northwest and in Ontario

By VICTOR LAURISTON

CHATHAM, Ont., Mar. 23.—In the Steveville field, 120 miles east of Calgary, Standard of British Columbia's No. 1 Princess, LSD 13, Section 22-20-12w4, which blew into heavy gas production from the Devonian limestone measured 65,000,000 cu. ft. a day after blowing uncontrolled for 9 days. The hole bottoms in the Devonian at 5,254 ft.

The well is one of the largest gassers ever drilled in Canada. Some weeks ago, No. 1 Battleview, in the Battleview-Vermilion area in East Central Alberta, was reported to have made 75,000,000 cu. ft. a day on test. In southern Alberta Range Oil & Gas Co.'s No. 1, on the Rogers-Imperial structure east of Coutts, had an estimated initial open flow close to 65,000,000 cu. ft. but later definite measurements showed around 45,000,000 to 55,000,000 cu. ft.

Wreckage of the derrick demolished when the Steveville well blew in, has been cleared away and preparations are being made to shut in the gas flow. The company originally intended to shut off the gas and drill deeper for oil, but now expects to cap No. 1 and drill a second test for oil, probably 15 miles southeast of the gasser. Previous tests by the Anglo-Canadian Oil Co. indicated an extensive gas field in the Madison limestone, but Standard's No. 1 was the first test to deepen into the Devonian. Some vaporized oil is coming with the gas from No. 1.

Turner Valley Completions

In North Turner Valley Home Oil Co.'s No. 4, LSD 9, Section 28-20-3w5, finished in the Madison limestone at 8,332 ft., has been given an allowable of 290 bbl. Previous temporary allowable was 250 bbl. Home's No. 3, LSD 1, Section 33-20-3w5, finished in the Madison at 8,311 ft., is continuing tests and adjustments while operating under 250-bbl. temporary allowable. Experiments at both wells include the use of both 2½ and 3-in. tubing, and running under long and short hookups with the separators.

In Section 31-18-2w5, Anglo-Canadian Oil Co.'s No. 7 LSD 9, finished in the Madison lime at 8,391 ft., is the largest well in the field with allowable fixed at 532 bbl. It showed 2,162 bbl. a day on 1-in. choke with gas-oil ratio of 610 cu. ft., the lowest in the field. Bottom-hole pressure was over 2,100 lb.

Tests in the Lime

In Section 6-19-2w5, East Crest Oil Co.'s No. 5, LSD 9, got the Madison limestone unexpectedly high at 7,316 ft., and has cemented below 7,321 ft. The test, started September 8 last, logged: Belly River-Benton contact, 3,280 ft.; pebbles, 4,760; cardium, 4,920; Jumping Pound sand, 5,450; grit beds, 5,907; Benton-Blairmore contact, 5,920; Home sand, 6,810; Dalhousie sand, 7,000; Blairemore-Kootenay contact, 7,030; Madison, 7,316. It is expected to finish some time in April.

In Section 5-19-2w5, Vanpeg Royalties' No. 1, finished in the Madison at 7,007 ft., is acidizing and testing production.

In Section 13-19-3w5, Arrow Royalties' No. 1, LSD 16, finished below 8,039 ft. after getting the lime at 7,620 ft. It is running tubing and acidizing. The upper lime showed 90 ft. of porosity and gave very satisfactory showings on drilling-stem test.

Record of Model Well

While the active west flank crude development dates from the completion of Turner Valley Royalties' No. 1 in June 1936, Model Oil's No. 1 in North Turner Valley was actually the first well to secure crude production from the Madison. It has been in continuous production since its completion in April 1930. It started as a naphtha producer, making about 165 bbl. a day from the upper lime but a few years later definitely turned to crude. Later developments have shown that the location was close to the crude-naphtha line on the west flank of North Turner Valley. Until proration was established, Model's No. 1 maintained a steady production over 140 bbl. a day. In the last schedule of allowables it was given 94 bbl. a day. Production of the well to the end of January 1940, was 456,846 bbl. This production representing a gross of $1,072,980 and net of $831,555, apparently came entirely from the upper porous horizon of the limestone, the well finishing at 5,905 ft., after getting the limestone at 5,800 ft.

West Side Drilling

In Section 32-18-2w5, west flank area, Royal Canadian Oil Co.'s No. 4, LSD 12, is in the lower Benton formation below 6,206 ft. Pacific Petroleum's No. 4, LSD 3, is in the upper Benton below 4,023 ft.

In Section 20-18-2w5, York Oil's No. 3, LSD 3, is in the Blairmore formation below 6,612 ft.

In Section 8-18-2w5, Northwest-Hudson's Bay Co.'s No. 3, LSD 15, is below 6,182 ft. after finding a repetition of the cardium sand at 5,410 ft.

West Central Field

In Section 18-19-2w5, West-Central Turner Valley, Okalta Oil Co.'s No. 9, LSD 13, has spudded. Davies Petroleum's No. 5, LSD 10, is in the Blairmore formation below 6,328 ft. Calmont-Northwest's No. 1, LSD 3, is in the Blairmore below 6,286 ft. after getting the grit beds at 5,760 ft.

In Section 7-19-2w5, Royalite Oil Co.'s No. 48, LSD 10, is below 5,461 ft. Anglo-Canadian's No. 9, LSD 6, has cellar finished and is working on derrick. Pacific Petroleum's No. 5, LSD 6, is below 1,960 ft.

In Section 6-19-2w5, Kamalta Oil's No. 1, LSD 1, is below 6,200 ft. and getting close to the Blairmore formation.

North Turner Valley

In Section 15-20-3w5, North Turney Valley, Anglo-Phillips' No. 1, LSD 14, is in the Blairmore formation below 7,496 ft., and getting close to the Madison lime.

In the Waite Valley area, National Petroleum Corp.'s No. 3, LSD 4, Section 25-20-4w5, is in the Fernie shales below 7,272 ft., and getting close to the belemnite formation immediately overlying the Madison lime, which should be found around 7,600 ft. The log shows the base of the Kootenay at 7,195 ft., the brown sand at 7,200 and the pyrites band at 7,220 ft. Production at this point would open a large new area, west of the main North Turner Valley field, for development.

East-Central Alberta

In the Vermilion field, East-Central Alberta, Franco-Vermilion's No. 1, Section 14-49-5w4, is deepening beow 1,850 ft. after encountering a strong gas flow at 1,610 ft. A second gas flow, estimated 1,500,000 cu. ft. a day, was met at 1,755 ft. Franco-Battleview's No. 3, LSD 13, Section 20-48-5w4, is rigged, and waiting for water supply.

Tests in the Foothills

On the Brazeau structure in the northern foothills west of Edmonton, Home Oil Co.'s No. 1, LSD 16, Section 7-43-17w5, is resuming from 6,665 ft., with the lime expected above 6,900 ft.

On the Grease Creek structure, Grease Creek-Northwest Co.'s No. 1, LSD 2, Section 13-29-7w5, will resume early in April from 7,017 ft.

On the Moose dome,, Canadian Royalties' No. 1, LSD 7, Section 22-29-6w5, is rigging. Dome Oil & Gas' No. 1, LSD 4, Section 16-22-6w5, is working on derrick. G. V. Burroughs has taken up acreage in Section 34-22-6w5, and 33-22-6w5, and E. Davey has secured LSD 3, Section 30-17-2w5. Command Oils of Calgary has secured parts of Sections 5 and 6, Township 22-6w5, and J. L. Sadleir has Section 8-22-6w5. Most of this acreage is close to Moose Oil's No. 2, which has a small commercial production of light crude from the Devonian limestone.

In the Pincher Creek area, Alliance Royalties' No. 2, LSD 14, Section 11-6-2w5, is moving outfit to location.

Wainwright Field

In the Wainwright field, East-Central Alberta, Montreal-Alberta Oil No.'s No. 1, LSD 2, Section 15-45-7w5, is preparing to deepen in the lime from about 3,414 ft. The test, which has been shut down for a considerable time, has apparently drilled through a comparatively thin section of the Madison lime into the Devonian, and has found some oil and gas shows in the lime. Location is west of Wainwright, and some distance from the main field.

Saskatchewan Drilling

In the Loydminister field, western Saskatchewan, Franco-Triangle's No. 3, LSD 13, Section 14-49-28w3, is below 1,120 ft. after setting the second string of casing. In the Alberta end of the field, Lloyd-Gates' No. 1, sponsored by Winnipeg interests, is rigged near Shaw Petroleum's No. 2 crude producer.

British Columbia Test

In northern British Columbia, two trucks are moving equipment for the British Columbia Government's No. 1 test near Commotion Creek in the Peace River Block. Newell & Chandler of Calgary, have contract for the test which will spud in about a month.

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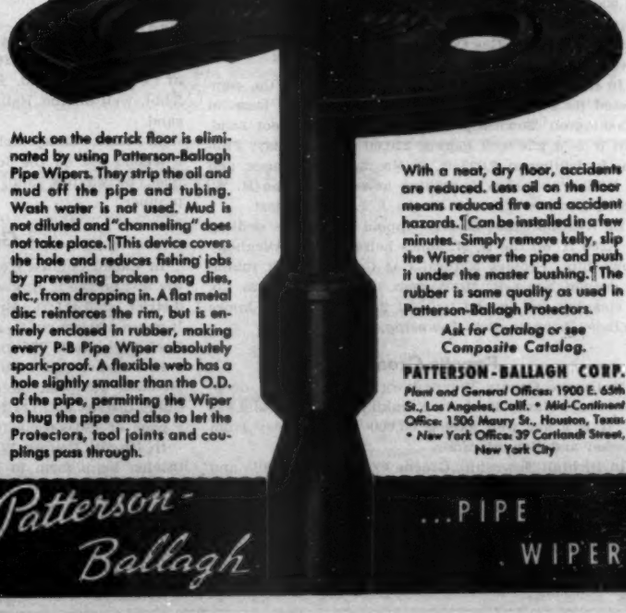

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Eastern Field Report

By STAFF CORRESPONDENT

High Water and Muddy Roads Holding Back New Field Work

PITTSBURGH, Pa., Mar. 25.—Little new work is starting in the lower eastern fields due to the usual spring freshets and bad roads. During the past week 16 operations were reported completed, of which 2 were dry holes, 9 gas wells and 5 oil wells with a daily initial of 22 bbl.

From southeast Ohio only one completion was reported. In Licking County, Guy T. Shrider and others drilled a second test on the I. N. Porter farm through the Berea sand to 630 ft. and it was dry. It is located in Section 8, Mary Ann Township.

In Cuyahoga County Benedum & Trees are drilling at 3,244 ft. on the Greenwood lease and at 2,750 ft. on the Boyleston lease, both in Mayfield Heights Village in the Newburg gas pool. The The Greenwood test is running low and may not make a well.

SOUTHWEST PENNSYLVANIA

In Armstrong County, Pa., T. W. Phillips Gas & Oil Co. completed a gas well on the John McKinney farm in Cowanshannock Township at 3,656 ft., Bradford sand. It gaged 59,000 cu. ft. a day. Peoples Natural Gas Co. is drilling at 1,960 ft. in the A. S. Rearick test and spudding in No. 2 Lee Bell, and in Plum Creek Township, is drilling at 1,075 ft. on the Frank Smith farm. T. W. Phillips Gas & Oil Co. is drilling at 1,514 ft. in the James Cessnar test; Equitable Gas Co. was spudding their Agnes Rugh test; Shelocta Oil & Gas Co. was drilling at 730 ft. on the Virginia Schaeffer land.

In Boggs Township, Armstrong County, Humphries, Stone, McCall Corp. is drilling at 910 ft. on the W. A. Dill farm. In Kittanning Township John Wray and others has reached 1,539 ft. on the Benjamin Miller farm. In South Buffalo Township W. A. Baker was drilling at 2,300 ft. in the James Bush test. In Wayne Township Penn Wayne Gas Co. had reached 2,490 ft. in the Seymore Paunch test.

Clarion-Indiana-Westmoreland

In Clarion County T. Swartzfager and others completed a 38,000-cu. ft. gas well on the C. A. Swartzfager farm in Porter Township at 2,554 ft., Bradford sand. In Limestone Township G. W. Hall completed a well on the C. Fairman farm at 2,847 ft. and it tests 21,000 cu. ft. a day. Owens Illinois Glass Co. is drilling at 2,212 ft. on the Alb Dietrick farm. In Red Bank Township Apollo Gas Co. has reached 1,375 ft. in No. 3 Susan Keck.

In Indiana County T. W. Phillips Gas & Oil Co. completed its second well on the Fee and Tomb lease in Washington Township at 1,370 ft., Thirty Foot sand, and it is a gas well gaging 220,00 cu. ft. a day. Phillips is drilling at 2,025 ft. in No. 2 N. M. Spence, and in White Township, is drilling at 846 ft. in the H. W. Leech test and at 700 ft. in the J. J. McClain test.

In Westmoreland County Appolo Gas Co. is drilling at 1,200 ft. on the D. M. Jones heirs land in Allegheny Township. Peoples Natural Gas Co. is pulling tubing to deepen No. 1 R. M. Watson. Kiski Valley Gas Co. is cleaning out around tools at 2,237 ft. on the James McBriar farm in Bell Township.

Fayette-Greene

In Greene County Waynesburg Home Gas Co. deepened No. 1 Nancy Rush, in Franklin Township, to 2,972 ft. It is a gas well gaging 65,000 cu. ft. a day from Gordon and Bayard sands.

In Richhill Township, Greene County, O. I. Dille and others are drilling at 1,760 ft. on the Madison Hughes farm with 105,000 cu. ft. of gas showing from the Injun sand. In Greene Township Equitable Gas Co. is down 1,361 ft. in No. 2 Hugh Keenan. In Monongahela Township Judson Bell and others are building a rig on the Samuel Black farm.

In Fayette County Wahler Power Oil & Gas Co. is rigging up on the Felix Valerio farm in German Township. Greensboro Gas Co. is drilling at 1,545 ft. on the Hicks and Holland lease, and in Nicholson Township, is rigging up the S. Kopsey test and is rigged up on the Emmet Diamond farm. Duquesne Gas Co. is rigging up on the Mary Durr farm.

Washington County

In South Franklin Township, Washington County, Burleigh Wright and others are drilling at 1,720 ft. in the Holmes Andrews test. Union Gasoline & Oil Corp. is hauling in a rig for No. 829 C. T. Conn. In Hanover Township H. K. Aten shut down at 1,710 ft. in No. 2 Lee Devitt.

In West Deer Township, Allegheny County, Walters and others are down 250 ft. in No. 2 John H. Flick, and Robert Marshall is spudding in No. 2 William Rittman.

Deep Tests

On Chestnut Ridge, in North Union Township, Fayette County, New Penn Development Co., William E. Snee and others, started deepening the test on the Piedmont Coal Co. from 6,800 ft. and, working a daylight trick only, reached 6,806 ft. with the gas volume remaining the same. On Laurel Ridge, in Stewart Township, these operators and E. G. Mueller are drilling at 6,250 ft. on the Gregg L. Neel farm. In Maryland these operators are still trying to regain the old hole below 4,647 ft. in the test on the Humberson farm on Accident dome in Garret County.

In Beaver County John T. Galey and others are drilling at 5,500 ft. on the James Tennis farm in South Beaver Township and have passed through the salt section below the Oriskany sand, and now fair daily progress is made.

WEST VIRGINIA

Several small producers were completed in West Virginia. In Kanawha County Silman Oil & Gas Co.'s No. 28 W. W. Rader, in Big Sandy district, at 2,147 ft., Weir sand, is good for five bbl. a day before shot.

In Pleasants County James B. Fell and others completed a 3-bbl. well on the Ralph Williamson farm in Union district at 1,668 ft. It also produces 40,000 cu. ft. of gas a day.

In Roane County American Oil Development Co.'s No. 7 I. F. Conly, in Harper district was a 5-bbl. well at 1,683 ft., salt sand. Bonnett Oil & Gas Co. has a new 5-bbl. well on the Ralph Raines farm at 1,659 ft., salt sand.

In Wood County Mellinger Oil & Gas Co. completed a second test on the John Marshall farm in Union district, in Maxton sand, at 1,679 ft., and it is a 2-bbl. pumper.

Gas Wells

In Cabell County West Virginia Gas Corp. completed the test on the S. R. and Mary Meade farm in McComas district, at 3,411 ft. Brown shale lay at 3,063-3,411 ft. It gages 160,000 cu. ft. a day from 3,098 ft. after a shot. Rock pressure is 335 lb.

In Putnam County Union Gas Development Co. completed a gas well on the Millard Carpenter farm in Curry district at 2,111 ft., with Berea at 2,067-98 ft. and a gage of 180,000 cu. ft. a day.

In Ritchie County W. R. Hays' test on the Glen W. Braden heirs farm in Murphy district was completed at 1,958 ft., and it is good for 212,000 cu. ft. a day along with 1 bbl. of oil from the Maxton and Injun sands. Murphy and Burk (formerly B. C. Deem) deepened No. 3 William McFadden to 2,060 ft., Injun sand, and it is making 300,000 cu. ft. of gas a day. In Clay district Moon Gas Co.'s test on the McMullen and Moore heirs farm, in Injun sand at 2,131 ft., is good for only ¼ bbl. a day and will be abandoned.

Oriskany Gas Field

No wells were completed in the Oriskany gas field in Kanawha County, but several are nearing the sand. Glass and others land. United Carbon Co. topped Corniferous lime at 4,902 ft. in the Louisa E. Long test, and farm, and is drilling at 2,133 ft. in No. 4864 W. J. Glass and others land. United Carbon Co. topped Corniferous lime at 4,902 ft. in the Louisa E. Long test, and is running 7-in. casing to 4,922 ft. Here, this company is drilling at 1,355 ft. on the Rosie Scott and others lease, and at 1,523 ft. in the W. C. Woodall and others' test, with the Big lime topped at 1,520 ft. Godfrey L. Cabot, Inc., is down 1,984 ft. in No. 4 Putnam Co.; has part of the material on the ground for No. 2 J. T. Bonham, and is building rig for No. 3 Columbian Carbon Co., topped Corniferous lime at 4,803 ft. in the Ida B. Mairs and others' test, and is drilling at 1,585 ft. in the V. E. King and others' test, and at 920 ft. in the Joseph Hughart test. In Elk district, this company is drilling at 4,777 ft. on the Leonard C. Hann land.

In Poca district West Virginia Gas Corp. is drilling at 1,670 ft. in the Leon Jones test and is building rig for the Elizabeth Thaxton test. W. O. Ziebold is down 1,350 ft. on the Hattie E. Clark land. In Union district Cameron Producing Co. is down 3,500 ft., J. S. Casdorph test.

In Jackson County Godfrey L. Cabot, Inc., is drilling at 5,200 ft. in No. 3 Putnam Co., in Ripley district.

Ohio Fields

(Continued from Page 210)

In Madison Township, Dowler Oil & Gas Co.'s No. 1 Lester Holtz, Lot 3, second quarter, is good for 200,000 cu. ft., open flow, from sand at 2,709-39 ft. Ohio Fuel Gas Co.'s No. 1 A. M. Irwine, Lot 3, second quarter, had a small showing of gas and was abandoned at 2,714 ft. In Newark Township, Wehrle Gas Co.'s No. 2 William Parker, third quarter, gaged 840,000 cu. ft., open flow, from sand at 2,295-2,322 ft. In Mary Ann Township Ohio Fuel Gas Co.'s No. 1 O. J. Barnes, Section 16, was dry; total depth 2,715 ft.

In Medina County, Chatham Township, two oil wells and one dry hole were completed in the Berea outside of the water-flooding area. Edson & Son's No. 3 Samuel Brandt, Lot 2, Tract 16, shot with 120 qt., 25 bbl. estimated initial production, total depth 500 ft. The test of the Dymo Oil Co., on Marcus Frank, Lot 26, Tract 16, shot with 40 qt., 15 bbl. initial production (estimated), total depth 479 ft. Edson & Son's No. 3 J. H. Auble, Lot 13, Tract 16, dry at 400 ft. In Spencer Township East Ohio Gas Co.'s No. 2 Eva G. Coomer, Section 6, is a gas well, gaging 420,000 cu. ft., open flow, in the Clinton. total depth 2,679 ft.

In Monroe County, Franklin Township, Driggs Oil Co.'s No. 4 J. B. Hogue, Section 32, is a 2-bbl. oil well at 827-37 ft. In Wayne Township L. E. Smith's No. 4 N. M. Smith, Section 27, has an open flow of 600,000 cu. ft. of gas in third Salt sand at 1,200-04 ft.

In Morgan County, Center Township, William Patten and others' No. 2 W. C. Fisher, Section 24, dry, total depth 1,704 ft.

In Tuscarawas County, Fairfield Township, Upham Gas Co.'s No. 1 Gracie Carl, Lot 2, third quarter, is a gas well in the Clinton, gaging 1,900,000 cu. ft. at 4,987-5,016 ft.

In Washington County, Barlow Township, Campbell and others' No. 1 A. W. Benson, Section 3, Squaw was dry, depth 1,367 ft. In Warren Township, Anderson's No. 1 J. W. Preston, Section 31, Maxton was dry, depth 1,367 ft.

WILDCAT OPERATIONS

CALIFORNIA

IMPORTANT WELLS AND SOUTHERN CALIFORNIA WILDCATS

Company, well, location, and county—	S. T. R.	Depth	Status
Union Oil, No. 33 Callender, Dominguez, L. A.	29- 3-13	6,790	completing
Union Oil, No. 75 Callender, Dominguez, L. A.	29- 3-13	7,396	flow 2,280 b.d.
Union Oil, No. 76 Callender, Dominguez, L. A.	32- 3-13	3,187	sd. sh. drlg.
Shell Oil, No. 102 Reyes, Dominguez, L. A.	33- 3-13	6,849	O.S. drlg.
Havenstrite, R. E., No. 2 Larronde, Dominguez, L. A.	32- 3-13	7,325	O.S. drlg.
Morton & Elder, No. 2 Dominguez, Dom., L. A.	3- 4-13	7,426	P.B. 7,100
Seaport Oil, No. 1 Dasteel, Dominguez, L. A.	32- 3-13	2,288	sd. sh. drlg.
Apex Pet., No. 1 Hatfield, Rosecrans, L. A.	20- 3-13	9,002	swab dry
St. Anthony Oil, No. 1 Gordon, Rosecrans, L. A.	19- 3-13	7,927	fish swab
Union Oil, No. 38 Rosecrans, Rosecrans, L. A.	19- 3-13	7,884	flow 279 b.d.
Union Oil, No. 39 Rosecrans, Rosecrans, L. A.	19- 3-13	7,950	O.S. drlg.
Royalty Service, No. 1 Cement, Rosecrans, L. A.	20- 3-13	9,148	gun perf.
Kelly & Sons, No. 2 McMillen, Rosecrans, L. A.	20- 3-13	4,488	sd. sh. drlg.
El Rey Oil, No. 1 Westmore, Athens, L. A.	2- 3-14	8,770	sd. sh. drlg.
Turf Oil, No. 1 H.R.A., Potrero, L. A.	34- 2-14	4,995	sd. sh. drlg.
Casa Grande Oil, No. 1 Lopez, San Fernando, L. A.	1- 2-15	2,320	cleaning out
Tide Water A. O., No. 12 Porter, Aliso Canyon, L. A.	27- 3-16	8,207	P.B. 7,551
Tide Water A. O., No. 13 Porter, Aliso Canyon, L. A.	27- 3-16	2,001	sd. sh. drlg.
Continental Oil, No. 1 Howell, Aliso Canyon, L. A.	2- 2-16	4,279	dry; abd.
Brit. Amer. Oil, No. 1 Perkins, Newhall, L. A.	14- 3-16	4,290	sd. sh. drlg.
Consolidated Pet., No. 4 Needham, Newhall, L. A.	13- 3-16	4,401	rig to pump
Barnsdall Oil, No. 9 R.S.F., Newhall, L. A.	27- 4-17	6,560	O.S. drlg.
Barnsdall Oil, No. 10 R.S.F., Newhall, L. A.	26- 4-17	4,281	sd. sh. drlg.
Vesta Pet., No. 1 Palos Verdes, Torrance, L. A.	31- 4-13	3,706	pump 125 b.d.
Barnhart & Morrow, No. 1 Comm., Wilmington, L. A.	32- 4-13	2,550	sd. sh. drlg.
Continental Corp., No. 1 L.A.C.F.C., Wilm., L. A.	2- 5-13	2,553	sd. sh. drlg.
Hancock Oil, No. 15-A Harbor, Wilmington, L. A.	35- 4-13	2,820	sd. sh. drlg.
Hancock Oil, No. 26-B Harbor, Wilmington, L. A.	35- 4-13	4,073	flow 350 b.d.
L. A. Basin Oil, No. 8 Kupfer, Wilmington, L. A.	35- 4-13	3,553	flow 205 b.d.
Long Beach Dev., No. 10-W-X Harbor, Wilm., L. A.	3- 5-13	4,094	completing
Long Beach Dev., No. 8-Z Harbor, Wilm., L. A.	2- 5-13	3,398	sd. sh. drlg.
O'Donnell, J. E., No. 1 Cliff, Wilmington, L. A.	35- 4-13	3,498	sd. sh. drlg.
Padreson Oil, No. 1-A Harbor, Wilmington, L. A.	35- 4-13	2,280	sd. sh. drlg.
Union Pacific R. R., No. 131, Wilmington, L. A.	3- 5-13	4,886	completing
Union Pacific R. R., No. 132, Wilmington, L. A.	4- 5-13	3,567	flow 470 b.d.
Union Pacific R. R., No. 133, Wilmington, L. A.	3- 5-13	4,015	liner stuck
Union Pacific R. R., No. 134, Wilmington, L. A.	3- 5-13	3,450	sd. sh. drlg.
Union Pacific R. R., No. 135, Wilmington, L. A.	4- 5-13	4,750	sd. sh. drlg.
Union Pacific R. R., No. 22-E, Wilmington, L. A.	3- 5-13	4,021	sd. sh. drlg.
Union Pacific R. R., No. 5-P.D., Wilmington, L. A.	3- 5-13	2,535	sd. sh. drlg.
West Whittier Oil, No. 1 Pellissier, Whittier, L. A.	17- 2-11	4,430	P.B. 3,450
Kern Oil, No. 34 Monterey, Montebello, L. A.	2- 2-12	7,260	sd. sh. drlg.
Kern Oil, No. 38 Monterey, Montebello, L. A.	2- 2-12	7,680	completing
Bush Oil, No. 2 Mihifred, Montebello, L. A.	3- 2-12	7,688	completing
C. A. P. Oil, No. 1 Dutch, Montebello, L. A.	11- 2-12	7,657	redrlg. 7,530
Columbia Oil, No. 1 Schelnik, Montebello, L. A.	3- 2-12	7,990	deepening
Franru Oil, No. 1 Condaffer, Montebello, L. A.	11- 2-12	7,618	flow 210 b.d.
Getty-Pac. West., No. 1 Pfister, Montebello, L. A.	10- 2-12	7,610	flow 405 b.d.
Grace Oil, No. 1 Duhrsen, Montebello, L. A.	3- 2-12	5,594	sd. sh. drlg.
Herley-Kelly, No. 3 Burke, Montebello, L. A.	2- 2-12	7,216	O.S. drlg.
Mabee Co., No. 6 Mulholland, Montebello, L. A.	2- 2-12	7,670	completing
Mabee Co., No. 39 Monterey, Montebello, L. A.	2- 2-12	7,660	O.S. drlg.
Mabee Co., No. 43 Monterey, Montebello, L. A.	2- 2-12	4,982	sd. sh. drlg.
Mono Oil, No. 1 Foreman, Montebello, L. A.	2- 2-12	7,620	deep test
Winlock Oil, No. 1 Win, Montebello, L. A.	11- 2-12	7,590	cleaning out
Allied Pet., No. 34 Signal, Long Beach, L. A.	30- 4-12	10,065	fish D.P.
Sunset Oil, No. 1 Alford, Long Beach, L. A.	29- 4-12	2,891	pump 75 b.d.
Kern Oil, No. 1 Signal, Long Beach, L. A.	24- 4-13	2,141	sd. sh. drlg.
Caminol Co., No. 3-19 Dominguez, Long Beach, L. A.	11- 4-13	7,674	P.B. 7,590
Johnson Drlg., No. 40 Signal, Long Beach, L. A.	13- 4-13	3,550	sd. sh. drlg.
Texas Co., No. 10-A Davidson, Long Beach, L. A.	19- 4-12	4,715	completing
Exeter Oil, No. 3 Olson, Long Beach, L. A.	19- 4-12	2,190	sd. sh. drlg.
Great Northern Oil, No. 1 Oak, Richfield, Orange	28- 3- 9	3,315	cleaning out
Mojave Pet., No. 1 Tuffree, Yorba Linda, Orange	21- 3- 9	2,490	P.B. 2,110
Fullerton Oil, No. 25 Brea, Brea Canyon, Orange	2- 3-10	3,550	gun perf.
Southwest Expl., No. 26 State, Hunt. Beach, Orange	10- 6-11	3,553	sd. sh. drlg.
H. R. O. Oil, No. 1 Hunt., Hunt. Beach, Orange	11- 6-11	4,782	redrlg. 2,200
Pacific American Oil, No. 6 Book, Hunt. Bch., Orange	36- 5-11	3,873	cleaning out
South Basin Oil, No. 95 H.B., Hunt. Beach, Orange	2- 6-11	7,590	redrlg. 4,180
United Oil, No. 1 Schimming, Stanton, Orange	25- 4-11	1,290	sd. sh. drlg.
Thompson, M. N., No. 1 Smith, Costa Mesa, Orange	9- 6-10	5,450	sd. sh. drlg.

IMPORTANT WELLS AND NORTHERN CALIFORNIA WILDCATS

Company, well, location, and county—	S. T. R.	Depth	Status
Union Oil, No. 4 Le Roy, Santa Maria, Barbara	24-10-35	4,990	sd. sh. drlg.
Hamilton, W. C., No. 1 Hollister, Goleta, Santa Barb.	3- 4-29	1,346	tested wet
T. O. Oil, No. 5 Mdivani, Mesa, Santa Barbara	28- 4-27	2,020	idle
Oil Group, No. 1 Hyland, Summerland, Santa Barb.	16- 4-26	1,850	sd. sh. drlg.
Merchants Pet., No. 8 Cochran, Sespe, Ventura	1- 4-20	2,160	sd. sh. drlg.
Ohio Oil, No. 1 Vail, Moor Park, Ventura	10- 2-19	5,091	sd. sh. drlg.
Sulphur Springs Oil, No. 1 Jones, Conejo, Ventura	33- 2-19	2,704	hd. sd. drlg.
Rio Hondo Oil, No. 1 Cosby, Hooper Canyon, Vent.	14- 4-19	1,150	sd. sh. drlg.
Continental Oil, No. 15 Grubb, San Miguelito, Vent.	24- 3-24	5,440	sd. sh. drlg.
C. C. M. Oil, No. 6-B Hobson, Rincon, Ventura	17- 3-24	4,276	redrlg. 4,148
C. C. M. Oil, No. 30-B Hobson, Rincon, Ventura	16- 3-24	5,175	O.S. drlg.
C. C. M. Oil, No. 9-A Hobson, Rincon, Ventura	15- 3-24	5,760	O.S. drlg.
Tide Water A. O., No. 43 V.L.W., Vent. Ave., Vent.	23- 3-23	9,475	recmtd. 9,460
Tide Water A. O., No. 45 V.L.W., Vent. Ave., Vent.	24- 3-23	8,550	sd. sh. drlg.
Tide Water A. O., No. 17 McGonigle, Vent. Ave., Ven.	23- 3-23	6,417	sd. sh. drlg.
Tide Water A. O., No. 119 Lloyd, Vent. Ave., Vent.	27- 3-23	6,040	sd. sh. drlg.
Tide Water A. O., No. 18 Hartman, Vent. Ave., Vent.	22- 3-23	10,885	redrlg. 9,650
Tide Water A. O., No. 22 Hartman, Vent. Ave., Vent.	22- 3-23	2,994	sd. sh. drlg.
Shell Oil, No. 113 Taylor, Ventura Ave., Ventura	29- 3-23	7,691	sd. sh. drlg.
Shell Oil, No. 114 Taylor, Ventura Ave., Ventura	29- 3-23	5,588	sd. sh. drlg.
Shell Oil, No. 115 Taylor, Ventura Ave., Ventura	29- 3-23	6,480	sd. sh. drlg.
Cal. Alliance Pet, No. 2 Hartman, Vent. Ave., Vent.	22- 3-23	8,850	sd. sh. drlg.
Cal. Alliance Pet, No. 1 Schmidt, Vent. Ave., Vent.	21- 3-23	2,562	sd. sh. drlg.
Lloyd Corp., No. 4 Dabney, Ventura Ave., Ventura	23- 3-23	10,135	P.B. 9,400
Trigg, H. C., No. 1 Den, Devil's Den, Kern	11-25-18	496	hd. sd. drlg.
Franco-Western Oil, No. 17 Front, McKittrick, Kern	8-30-22	2,213	O.S. drlg.
Mid-State Pet., No. 1 Welport, McKittrick, Kern	26-29-21	1,092	O.S. drlg.
Union Oil, No. 1 Weston, Belridge, Kern	13-29-21	4,880	sd. sh. drlg.
Belridge Oil, No. 11-1 fee, North Belridge, Kern	1-28-20	8,017	sd. sh. drlg.
Belridge Oil, No. 23-1 fee, North Belridge, Kern	1-28-20	6,870	br. sh. drlg.
Belridge Oil, No. 53-26 fee, North Belridge, Kern	28-27-20	8,410	redrlg. 8,060
Texas Co., No. 1 Theta, Shale Hills, Kern	12-28-19	3,395	sd. sh. drlg.
Bishop Oil, No. 2 Buchner, Mount Poso, Kern	20-26-28	910	sd. sh. drlg.
Golden Bear Oil, No. 1 Glide, Mount Poso, Kern	19-26-28	1,730	sd. sh. drlg.
Hearte & Tracy, No. 1 Hooper, Mount Poso, Kern	36-26-27	1,270	sd. sh. drlg.
Davis Pet., No. 1 Kernco, Kern Front, Kern	13-28-27	1,294	rig to pump
Dick & Dore Oil, No. 19 Kern, Kern River, Kern	34-28-28	333	O.S. drlg.
Dick & Dore Oil, No. 20 Kern, Kern River, Kern	34-28-28	393	pump 1 b.d.
Dick & Dore Oil, No. 23 Kern, Kern River, Kern	34-28-28	645	rig to pump
Dick & Dore Oil, No. 24 Kern, Kern River, Kern	34-28-28	496	O.S. drlg.
Hast Oil, No. 7 Kern, Kern River, Kern	34-29-28	562	O.S. drlg.
Helm & Smith, No. 19 Kern, Kern River, Kern	34-28-28	475	sd. sh. drlg.
Mayes, A. S., No. 1 O.S.E., Edison, Kern	5-30-29	4,160	pump 60 b.d.
Goodrum & Vincent, No. 3 S.P., Edison, Kern	31-29-30	803	idle
Wood-Callahan Oil, No. 1 Heyden, Edison, Kern	21-30-29	4,369	P.B. 3,620
Allied Pet., No. 35 Allied, Mountain View, Kern	19-30-29	5,347	P.B. 5,287
Morton, L. C., No. 1 Jewett, Arvin, Kern	23-31-29	....	rigging up
Western Gulf Oil, No. 45-B, KCL, Fruitvale, Kern	22-29-27	7,691	hd. sh. drlg.
Western Gulf Oil, No. 1 Ansolabehere, Fruit., Kern	14-29-27	3,050	pump 65 b.d.
Trico O. & G., No. 5 M.&L., Delano Field, Kern	3-25-23	2,467	will deepen
Standard Oil, No. 4 Mushrush, Wasco, Kern	7-27-24	9,952	sd. sh. drlg.
Continental Oil, No. 5-8-A, KCL, Wasco, Kern	8-27-24	13,157	flow 2,568 b.d.
Continental Oil, No. 1 Meyer, Wasco, Kern	7-27-24	12,470	sd. sh. drlg.
Continental Oil, No. 1 Community, Shafter, Kern	12-28-24	11,940	sd. sh. drlg.
Union Oil, No. 32-34, KCL, Rio Bravo, Kern	34-28-25	6,752	sd. sh. drlg.
Union Oil, No. 56-27, KCL, Rio Bravo, Kern	27-28-25	11,290	sd. sh. drlg.
Superior Oil, No. 3 Fink, Rio Bravo, Kern	28-28-25	7,780	sd. sh. drlg.
Superior Oil, No. 3 Smith, Rio Bravo, Kern	34-28-25	9,594	sd. sh. drlg.
Standard Oil, No. 11-23, KCL, Greeley, Kern	18-29-26	10,790	hd. sh. drlg.
Standard Oil, No. 12-7, KCL, Greeley, Kern	7-29-26	11,510	completing

KEY TO ABBREVIATIONS USED IN DRILLING REPORTS

Abd., abandoned.
Acd., acidized.
B.O., barrels of oil.
B.P.D., barrels per day.
B.D., barrels daily.
B.P., back pressure.
B.R., building rig.
B. ck., bottom choke.
Br. sh., brown shale.
B.S., basic sediment.
C.&P., cellar and pits.
Cd. or Crd., cored.
C.D., correct depth.
Cg., coring.
Cmtd., cemented.
C.O., cleaning out.
Comp., completed.
Compr., compressor.
C.P., casing pressure, also cement through perforations.
Csg., casing.
D.D., drilling (or drilled) deeper.
Drlg., or Drg., drilling.
Drk. or Dk., derrick.
D.S., drill stem.
D.S.T., drill-stem test.
D.P., drill pipe.
D.&A., dry and abandoned.
Fsg., fishing.
Gbo., gumbo.
G.I., gas injection.
Gr., gravity.
Gr. sd., gray sand.
Grn. sh., green shale.
Hd. sd., hard sand.
H.F.W., hole full of water.
I.P., initial production.
L., lime.
Lnr., liner.
Loc., location.
M.I.M., moving in material.
M.I.R., moving in rig.
M.I.R.T., moving in rotary tools.
M.O.T., milling on tools.
O.I.H., oil in hole.
O.S., oil sand.
O.T.D., old total depth.
O.W.D.D., old well drilling deeper.
O.W.P.B., old well plugging back.
P.B., plugging back.
P.B.P., pulling or pulled big pipe.
P.L., pipe line.
P.L.O., pipe-line oil.
Pmpg., pumping.
P.O.P., putting on pump.
P.P., pulled pipe.
Rd. sd., red sand.
Rd. sh., red shale.
Recmt., recemented.
Recvd., recovered.
Rmg., reaming.
Redrlg., redrilling.
Rng., running.
R.O.G., rig on ground.
R.P., rock pressure.
R.U., rigging up.
R.U.R., rigging up rotary.
R.U.S.T., rigging up standard tools.
R.&T., rods and tubing.
S. or Sd., sand.
S.D., shut down.
Sdy. sh., sandy shale.
Sdtrk. or St., sidetracked.
S.D.P.L., shut down for pipe line.
S.D.O., or S.D.W.O., shut down awaiting orders.
S.G., show gas.
Sh.&L., shale and lime.
S.I., shut in.
S.I.P., shut in, prorated.
S.L.M., steel-line measurement.
S.O., show oil.
S.O.G.&W., show of oil, gas, and water.
Spdg. or Spd., spudding.
S.R., straightreaming.
Stdg., standardizing (also standing).
S.W., salt water.
Swbg., swabbing.
T.A., temporarily abandoned.
Tbg., tubing.
T.D., total depth.
T. ck., top choke.
T.P., tubing pressure.
Tr., tract.
Tstd., tested.
U.R., underreaming.
W.I.H., water in hole.
W.O., workover.
W.O.C. or W.O.C.S., waiting on cement to set.
W.O.O., waiting on orders.
W.P., working pressure.
W.S.O., water shutoff.
W.S.O.O.K., water shutoff O.K.
W.S.R. or W.O.S.R., awaiting standard rig
Wtr., water.

Standard Oil, No. 12-8, KCL, Greeley, Kern	7-29-26	8,864	sd. sh. drlg.
General Pet., No. 1 Oughton, Greeley, Kern	12-29-25	7,588	sd. sh. drlg.
General Pet., No. 2 Sullivan, Greeley, Kern	12-29-25	4,267	sd. sh. drlg.
Shell Oil, No. 63-25-B, KCL, Ten Section, Kern	29-30-26	2,966	sd. sh. drlg.
Shell Oil, No. 72-30-A, KCL, Ten Section, Kern	30-30-26	8,080	sd. sh. drlg.
Shell Oil, No. 34-28-B, KCL, Ten Section, Kern	28-30-26	8,220	completing
Tide Water-Cont., No. 33-7-E, KCL, Strand, Kern	7-30-26	5,693	sd. sh. drlg.
Shell-Ohio, No. 64-12-A, KCL, Strand, Kern	12-30-25	8,570	redrlg. 8,539
Ohio Oil, No. 18-E, KCL, Canal, Kern	13-30-25	7,940	sd. sh. drlg.
Shell Oil, No. 85-15-A, KCL, Canal, Kern	15-30-25	8,250	flow 1,395 b.d.
Richfield Oil, No. 38-28-A, KCL, Tupman, Kern	28-30-25	3,661	sd. sh. drlg.
Richfield Oil, No. 74-32-A, KCL, Tupman, Kern	32-30-25	8,438	sd. sh. drlg.
Richfield Oil, No. 72-33-B, KCL, Tupman, Kern	33-30-25	9,166	O.S. drlg.
Richfield Oil, No. 76-29-A, KCL, Tupman, Kern	29-30-25	8,517	dry; abd.
Richfield Oil, No. 78-29-A, KCL, Tupman, Kern	29-30-25	7,252	sd. sh. drlg.
Richfield Oil, No. 12-3-C, KCL, Cole's Levee, Kern	3-31-25	9,413	sd. sh. drlg.
Shell Oil, No. 81-17-B, KCL, Cole's Levee, Kern	17-31-25	10,294	hd. sh. drlg.
Ohio Oil, No. 7-F, KCL, Cole's Levee, Kern	3-31-25	9,760	flow 520 b.d.
Tide Water A. O., No. 72, KCL, Cole's Levee, Kern	14-31-25	9,860	hd. sh. drlg.
Foster, Robert, No. 1 Hollingsworth, Md.-Sun., Kern	22-32-23	1,010	sd. sh. drlg.
General Pet., No. 1 B.V.A., Midway-Sunset, Kern	1-32-24	11,680	hd. sh. drlg.
Signal Oil & Gas, No. 7 Kendon, Mdwy.-Sun., Kern	35-32-23	2,296	sd. sh. drlg.
Shell Oil, No. 45-9 B.V.A., Midway-Sunset, Kern	9-32-25	10,970	sd. sh. drlg.
National Oil, No. 35 Sunset, Midway-Sunset, Kern	35-32-23	1,520	pump 25 b.d.
National Oil, No. 36 Sunset, Midway-Sunset, Kern	35-32-23	1,098	sd. sh. drlg.
McDonald, Joseph, No. 19 Midway, Mdwy.-Sun., Kern	26-31-22	1,300	sd. sh. drlg.
Ohio Oil, No. 43-3-B, KCL, Paloma, Kern	3-32-26	10,361	fish D.P.
Western Gulf-Texas, No. 74-3-A, KCL, Paloma, Kern	3-32-26	10,930	sd. sh. drlg.
Shell Oil, No. 52-2-13-A, KCL, San Emidio, Kern	13-11-22	12,480	swab water
Burrhus, V. E., No. 1 Haberkern, Elkhorn, Kern	21-32-22	2,730	br. sh. drlg.
Oil Scout, No. 1 Tejon, Comonche Point, Kern	27-32-28	4,191	sd. sh. drlg.
Richfield Oil, No. 1 Hill, Tejon Ranch, Kern	2-10-19	2,181	sd. sh. drlg.
Jergins Trust, No. 1 Cheney, Panoche Creek, Fresno	29-14-13	7,581	sd. sh. drlg.
Texas Co., No. 1 S.P., Turk anticline, Fresno	23-17-15	9,390	hd. sh. drlg.
Tide Water A. O., No. 22 Guardian, E. Coa., Fresno	2-20-15	2,085	sd. sh. drlg.
Standard Oil, No. 71-19-B fee, N.E. Coalinga, Fresno	19-19-16	8,255	O.S. drlg.
Union Oil, No. 68-18 Cook, N.E. Coalinga, Fresno	18-19-16	8,285	O.S. drlg.
Amerada Pet., No. 28-17 S.P.L., N.E. Coa., Fresno	17-19-16	8,168	O.S. drlg.
Bandini Pet., No. 46-18-B, N.E. Coalinga, Fresno	18-19-16	9,614	P.B. 7,985
Superior Oil, No. 4 Husong, N.E. Coalinga, Fresno	18-19-16	6,165	sd. sh. drlg.
Lytle, R. S., Agent, No. 86-12-C, S.E. Coalinga, Fresno	12-20-15	6,660	br. sh. drlg.
Lytle, R. S., Agent, No. 51-7-F, S.E. Coalinga, Fresno	7-20-16	7,110	sd. sh. drlg.
Lytle, R. S., Agent, No. 24-18-F, S.E. Coalinga, Fresno	18-20-16	7,533	flow 2,070 b.d
Lytle, R. S., Agent, No. 48-18-F, S.E. Coalinga, Fresno	18-20-16	1,966	sd. sh. drlg.
Univ. Cons'd. Oil, No. 61-24-C, S.E. Coalinga, Fresno	24-20-15	7,896	hd. sh. drlg.
Standard Oil, No. 77-13-C fee, S.E. Coalinga, Fresno	13-20-15	7,430	O.S. drlg.
Standard Oil, No. 22-19-F fee, S.E. Coalinga, Fresno	19-20-16	6,641	br. sh. drlg.
Standard Oil, No. 33-19-F fee, S.E. Coalinga, Fresno	19-20-16	5,997	sd. sh. drlg.
Standard Oil, No. 42-19-F fee, S.E. Coalinga, Fresno	19-20-16	7,554	fish D.P.
Superior Oil, No. 2-B Cagle, S.E. Coalinga, Fresno	6-20-16	7,162	sd. sh. drlg.
Texas Co., No. 1 Boston, Westhaven, Fresno	14-20-18	9,500	hd. sh. drlg.
Union Oil, No. 9 King, Kettleman N. Dome, Fresno	29-21-17	6,282	sd. sh. drlg.
K. N. D. A., No. 27-18-J, Kettleman N. Dome, Fresno	18-21-17	10,777	gr. sd. drlg.
K. N. D. A., No. 334-18-J, Kettleman N. Dome, Fresno	18-21-17	10,605	hd. sh. drlg.
K. N. D. A., No. 25-16-Q, Kettleman N. Dome, Kings	16-22-18	7,800	flow 2,271 b.d
K. N. D. A., No. 34-22-Q, Kettleman N. Dome, Kings	22-22-18	7,000	sd. sh. drlg.
K. N. D. A., No. 6-26-Q, Kettleman N. Dome, Kings	26-22-18	8,250	completing
K. N. D. A., No. 38-26-Q, Kettleman N. Dome, Kings	26-22-18	8,368	completing
Standard Oil, No. 72-19-J, Kett. N. Dome, Fresno	19-21-17	10,903	redrlg. 10,670
Standard Oil, No. 321-29-J, Kett. N. Dome, Fresno	29-21-17	7,851	hd. sh. drlg.
Standard Oil, No. 57-3-P, Kett. N. Dome, Kings	3-22-17	8,020	gr. sh. drlg.
Standard Oil, No. 72-17-Q, Kettl. N. Dome, Kings	17-22-18	8,690	P.B. 8,130
Standard Oil, No. 41-27-Q, Kettleman N. Dome, Kings	27-22-18	6,791	sd. sh. drlg.
Standard Oil, No. 63-27-Q, Kettleman N. Dome, Kings	27-22-18	6,885	sd. sh. drlg.
Standard Oil, No. 72-27-Q, Kettleman N. Dome, Kings	27-22-18	7,000	sd. sh. drlg.
Standard Oil, No. 83-27-Q, Kettleman N. Dome, Kings	27-22-18	8,306	completing
Standard Oil, No. 85-27-Q, Kettleman N. Dome, Kings	27-22-18	7,550	sd. sh. drlg.
Standard Oil, No. 41-35-Q, Kettleman N. Dome, Kings	35-22-18	7,074	sd. sh. drlg.
Standard Oil, No. 63-35-Q, Kettleman N. Dome, Kings	35-22-18	8,470	P.B. 8,000
Shell Oil, No. 1 Cohn, Tulare Lake, Kings	4-22-19	10,035	cleaning out
Holly Dev., No. 1 Meherin, Huasna, San Luis Obispo	7-32-13	1,448	sd. sh. drlg.
Buttes Oilfields, No. 6 Buttes, Marysville, Sutter	1-15- 1	7,691	sd. sh. drlg.
Richfield Oil, No. 2 Hill, Potrero, Solano	5- 4- 1	3,099	gr. sh. drlg.
Tassajara Oil, No. 1 Rasmussen, Tass., Contra Costa	9- 2- 1	9,631	sd. sh. drlg.

OKLAHOMA

Week Ended March 23

NORTHERN OKLAHOMA

Beckham County

Fred Coogan's No. 1 Kinchen, SE SE SE Sec. 4-9-25w. Drlg. 2,756 ft.

Caddo County

Sinclair Prairie Oil Co.'s No. 1 Groman, SW NW NW Sec. 1-16-13w. Wlx. 9,179 ft.; sd. 10,074 ft.; drlg. 10,081 ft.

Comanche County

Mid Night Oil's No. 1 Howe, NW NW NE Sec. 30-2-13w. O.W.D.D.; O.T.D. 703 ft.; dpnd. to 998 ft.; acd. and swbd. wtr. and S.S.O.; to pull pipe and abd.

Creek County

Bryan Pet. Co.'s No. 1 Ah-Say, NE NW NE Sec. 34-14-7. Prue 2,556 ft., S.O.; T.D. 2,652 ft.

Indo Oil Co.'s No. 1 Slick, NW NW NW Sec. 1-16-9. Drlg. 370 ft.

Dewey County

Magnolia Pet. Co.'s No. 1 Fiekes, C SW SW Sec. 31-18-14w. D.S.T. rec. mud at 7,718 ft.; drlg. 8,260 ft.

Garfield County

Magnolia's No. 1 Kring, C SE SW Sec. 12-21-3w. Cg. 2,910 ft.

Garvin County

Travis Sanders' No. 1 Buckner, NW NW SW Sec. 27-1-2w. S.S.O. 2,030 ft.; T.D. 3,004 ft.; D.&A.

Grant County

Continental Oil Co.'s No. 1 Krichmar, SE SE NE Sec. 28-28-5w. Cg. 4,971 ft. in Miss.

Hughes County

J. W. Boydston's No. 1 Robstein, C NW SE Sec. 11-6-9. Drlg. 300 ft.

Hall & Jordan's No. 1-A Barker, SE SE SW Sec. 3-8-9. S.O. in sd. 2,074 ft.; T. D. 2,109 ft.; R.U.S.T.

Geo. Pace's No. 1 Cahill, C E½ NE SW Sec. 2-6-8. T.D. 2,917 ft.; cd. 2,765-73 ft.; S.S.O.

Walker & Johnson's No. 2 Rogers, NE NE NE Sec. 24-7-9. Drlg. 438 ft.

Kay County

Malarnee Oil Co.'s No. 1 Harris, C SW NE Sec. 14-25-1. Drlg. 3,958 ft.

Kingfisher County

Phillips Pet. Co.'s No. 1 Drape, C NW SE Sec. 30-18-5w. Cg. 3,710 ft.

Kiowa County

Frank Dillard et al's No. 1 Hobbs, SE SE NW Sec. 35-6-17w. Set 6⅝-in. 525 ft.; T.D. 690 ft.

Lincoln County

Jones Assoc.'s No. 1 Warren, NW NW SW Sec. 28-15-5. Drlg. 2,435 ft.

R. M. Purcell et al's No. 1 Wolcott, NW NW NW Sec. 2-13-4e. R.O.G.

Logan County

Helmerich & Payne's No. 1 McMahon, SW SW SE Sec. 31-17-1. Hntn. 4,983 ft.; Vla. 5,175 ft.; Wlx. 5,272 ft.; 2nd Wlx. 5,420 ft.; P.B. 5,332 ft.; F. 2 B.O. P.H.; acdz.

McIntosh County

Phillips' No. 1 Blankenship, C SW NW Sec. 33-10-13. T.D. 3,042 ft.; P.B. 2,-996 ft.; to straighten hole.

Muskogee County

R. Garrett's No. 1 Escoe, SW SW SE Sec. 16-13-17. S.D. 1,665 ft.

Okfuskee County

Burke-Greis' No. 1 Dew, NE NE NE Sec. 9-12-9. R.U.S.T.

Payne County

Helmerich & Payne's No. 1 Kramer, NW NW SE Sec. 24-17-1e. Vla. 4,931 ft.; Wlx. 5,014 ft.; cd. 5,015-20 ft.; 2nd Wlx. 5,145 ft.; T.D. 5,157 ft.; P.B. 4,855 ft.; perf.; W.O.C.

R./L. Kemp's No. 1 Meyer, NW SE SE Sec. 17-17-6. T.D. 575 ft.

Texas Co.'s No. 1 Burroughs, C E½ NE NW Sec. 11-17-1. Drlg. 4,717 ft.

Seminole County

W. A. Mason et al's No. 1-A Reid, NW NW NE Sec. 13-9-7. N.S.; T.D. 2,294 ft.; R.U.S.T.

Tom Nix' No. 2 Warren, C E½ NE SE SE Sec. 4-6-8. S.D. 930 ft.

Stanolind O. & G. Co.'s No. 1 Aldridge, NW NE SE Sec. 32-9-8. Htn. 4,127 ft.; Vla. 4,304 ft.; 1st Wlx. 4,370 ft.; T.D. 4,394 ft.; 2,300 ft. O.I.H.; W.O.C.

Wagoner County

G. E. Cahil's No. 1-A McCall, NE NE NE Sec. 10-17-15. S.D. 1,116 ft.

Washita County

Continental Oil Co.'s No. 1 School ld., C NE Sec. 16-8-16w. T.D. 3,900 ft.

SOUTHERN OKLAHOMA

Atoka County

Brookshire et al's No. 1 Jones, C SW NW Sec. 29-3s-12. T.D. 2,045 ft.; lost bit; may test Mayes at 1,945 ft.

Carter County

W. F. Turner's No. 1 Smith, NE SW SE Sec. 16-3s-1w. S.D. 3,640 ft.

Choctaw County

Clyde Ross et al's No. 1 Hardy, SE SE NW Sec. 21-7s-15. T.D. 1,916 ft., sdy. L. and S.S.O.; S.D.

Jackson County

Jones & Robinson's No. 1 Neal, SW SW SW Sec. 8-1s-20w. Rig.

Jefferson County

Fred Land et al's No. 1 Barrett, NE SE SE Sec. 14-6s-6w. Sd. 1,852 ft., S.O.; D. P. stk. at 1,100 ft.; T.D. 1,890 ft.; S.D.

Marshall County

Johnson et al's No. 1 Godfrey, SW SE NE Sec. 14-6s-6e. Vla. 2,627 ft.; S.S.O.; T.D. 4,455 ft. in sd.; S.O.; prep. to D.D. ft.; S.D. repra.

May Oil Corp.'s No. 1 Sacrea, SW NE SW Sec. 17-5-5. Sd. and S.G. 1,023-27 ft.

Pure Oil's No. 1 Little, W½ NE SE Sec. 28-5s-7e. At 5,103 ft.; est. 30 B.O.P.H. and 3,000,000 cu. ft. gas; drlg. L. 5,-235 ft.

Murray County

C. P. Williams' No. 1 fee, NE NE SE Sec. 22-1n-4. Arb. 650 ft.; drlg. 950 ft.

Stephens County

Edwin Bristow's No. 1 Damron, SE NW SW Sec. 25-2s-6w. T.D. 1,545 ft.

KANSAS

Week Ended March 23 (Descriptions are East unless marked otherwise)

Barton County

Phillips' No. 1 Wondra, CWL SW NE Sec. 15-17-12w. Lans. 3,049 ft.; 700 ft. O.I.H., 10 hrs.; congl. 3,292 ft.; Arb. 3,316 ft.; S.O.&W. 3,318-20 ft.; H.F.W. 3,325 ft., T.D.; P.B. to 3,054 ft.; drld. cmt. to 3,090 ft.; 450 ft. O.I.H.; P. 33 B.O. in 8 hrs.

Butler County

Atlantic and Sinclair's No. 1 Smith, SE SE NW Sec. 33-33-4. Miss. 3,256 ft.; drlg. 3,416 ft.

Carey & Jennings' No. 1 Kelley (O.W. D.D.), SE NW SW Sec. 20-27-4. O.T.D. 2,660 ft.; drlg. 2,735 ft.

Cloud County

E. T. Lindsay et al's No. 1 LeBlanc, C S½ SW NW Sec. 35-6-1w. R.R.

Cowley County

Atlantic and Sinclair's No. 1 Smith, SE SE NW Sec. 33-33-4. Tpka. 1,365 ft.; drlg. 2,785 ft.

C. L. Cariock's No. 1 Starkey, CSL SE SE Sec. 21-30-7. S.D. 35 ft.

J. W. Murfin's No. 1 Jarvis, N½ SW NE Sec. 19-31-5. Loc.

Markey & Talbot's No. 1 Anderson, C N½ NE NW Sec. 21-30-3. Miss. 3,103 ft.; T.D. 3,211 ft.; D.&A.

Markey & Mission's No. 1-A Hunt, SW SW NE Sec. 16-34-5. T.D. 1,756 ft.; ga. 3,800,000 cu. ft. gas.

C. F. Meyers'. No. 1 Dunn, NW NW NW Sec. 33-34-5. Drlg. 3,321 ft.

Ellis County

Dickey Oil's No. 1 Stone, N½ NE SW Sec. 4-11-17w. B.R.R.

Ellsworth County

Lauck & Moncrief's No. 1 Ehler, CWL SW NW Sec. 35-16-10w. Lans. 2,943 ft.; Arb. 3,295-97 ft.; S. 33 B.O. in 2 hrs.; T.D. 3,318 ft.; S. 32 B.O.

Greenwood County

A. A. Hinze et al's No. 1 Hester, NW SW NE Sec. 1-22-12. S.D. 510 ft.

Marylyn Oil's No. 1 Burke, NE NE SW Sec. 27-24-11. Set 10-in. 685 ft.; S.D. 725 ft.; T.D. 825 ft.

C. L. Sheedy et al's No. 1 Hook, NW SW NW Sec. 4-22-10. T.D. 3,244 ft. in Miss.; S.S.O. ;to acdz.

Jefferson County

McLaughlin Sons, Inc.'s No. 1 McLaughlin, SW NE NW Sec. 4-10-20. T.D. 1,-915 ft.; whpstk. 1,858 ft.; P.B. 1,550 ft.; S.D.

McPherson County

Aladdin Pet. Co.'s No. 1 Bitikofer, CNL NE NW Sec. 1-20-1w. Cellar.

Marion County

Harrington & Lorieaux's No. 1 Belton SE SE NE Sec. 30-17-4. Skd. rig 40 ft. N; drlg. 198 ft.

H. H. Royer's No. 1 Kroch, NE NE NW Sec. 28-18-4. S.D. 2,128 ft.

Reno County

Dutton et al's No. 1 Green, SE SE SE Sec. 8-23-4w. S.D. 1,200 ft.

Rooks County

Seaney & Clampitt's No. 1 Morrison, CSL SW NE Sec. 32-10-17w. Loc.

Russell County

I. W. Murfin et al's No. 1 St. Aubyan, CSL SW SE Sec. 1-15-15w. Tpka. 2,710 ft.; Lans. 3,000 ft.; drlg. 3,077 ft.

Sedgwick County

G. A. Fuller's No. 1 Stilt, CSL SE NE Sec. 21-27-1w. S.S.O. 2,678 ft.; incr. at 2,798-2,806 ft.; P. 70 B.O. in 8 hrs.

Sunray Oil Co.'s No. 1-A McMillan, CWL NW NW Sec. 14-29-2w. Miss. 3,564 ft.; D.S.T. 3,575 ft. and rec. S.O. and mud; Arb. 4,030-55 ft., T.D.; P.B. 3,590 ft.; fsg. tools.

Trego County

J. E. Trigg's No. 1 Rasek, C NE NE Sec. 13-12-23w. Drlg. 800 ft.

MISSOURI

Adair County

Eddington et al's No. 1-A Clark, NE NE SE Sec. 8-63-14w. Drlg. 647 ft.

Eddington-McAlpin's No. 1 Johnson-Capps, SW SW Sec. 31-64-15w. Drlg. 480 ft.

Holt County

Brin & Nathan's No. 1 Decker, C NW NW Sec. 1-61-38w. T.D. 1,030 ft.; S.D. for csg.

Platte County

Geo. Vincent et al's No. 1 Dillingham, C NE SW Sec. 16-53-34w. T.D. 1,055 ft.; S.D. to run 8-in. csg.

Schuyler County

T. E. Baldwin's No. 1-A Johnson, NW NE NE Sec. 21-65-15w. Vla. 1,280 ft.; T.D. 1,505 in Arb.; pulling 6-in. csg.

Rogers & Morrow's No. 1 Seamster, Sec. 6-65-13w. Preparing to set 6-in. pipe at 925 ft.

IOWA

Union County

Phillips Pet. Co.'s No. 1 Creston, C SE NE Sec. 31-71-30w. Hntn. 1,595 ft.; drlg. 2,721 ft.

ARIZONA

Cochise County

Funk Benevolent Corp.'s No. 1 fee, SE NE Sec. 27-13s-30e. Fsg. 6,668 ft.; S.S. G.&O.

Maricopa County

Sam F. Reaves' No. 1 King, SW SE Sec. 33-1n-4w. Set csg. 1,800 ft.

Peoples O & G. Co.'s No. 1 Gardner, SE¼ Sec. 2-1n-3e. Set 10-in. 1,140 ft.; U.R. at 1,200 ft.

Pima County

R. W. Schenck's No. 1 Boyce, Sec. 22-19s-17e. S.D. 350 ft.

Yavapai County

Ari-Copa Drlg. & Mining Co.'s No. 1 Puntenney, SW¼ Sec. 27-18n-2w. S.D. 460 ft.

Chino Valley Oil Dev. Co.'s No. 1 State, Sec. 20-18n-2w. T.D. 1,200 ft.

Yuma County

Chas. T. Lark, Sec. 7-7s-14w. Loc.

Yuma Valley O. & G. Co.'s No. 1 Musgrove, N½ SW NW NE Sec. 11-11s-25w. Cd. 3,320-30 ft.; good S.O.&G.; drlg. sh. 4,462 ft.

NEBRASKA

Cass County

Golden Rod Oil Co.'s No. 1 Sparer, SE SE SE Sec. 8-11-13e. S.D. 1,205 ft., Vla. L.

Dakota County

Peder Skriver's No. 1 Armor, NE NE NE Sec. 33-28-8. T.D. 1,100 ft.; S.D.

Dawes County

G. E. Mitchell's No. 1 Palmer, NW NW SW Sec. 1-33-50w. (O.W.D.D.); O.T.D 2,964 ft.; R.U. to D.D.

Keith County

California-Nebraska Oil, Ltd.'s No. 1 Guststuehm, NW NW NW Sec. 21-14-37w. Dak. 2,772 ft.; S.O. 2,895-2,901 ft.; cd. 3,258-61 ft.; S.S.O.; S.D. 3,300 ft.

Fillmore County

Dan Kornfeld's No. 1 Mathis, NE NE NE Sec. 22-5-1w. S.D. 2,003 ft.

Pawnee County

Blaser & Hoerman's No. 1 Wilson, NE NW NW Sec. 4-1-10. S.S.O. 470-71 ft.; drlg. 476 ft.

Richardson County

Pawnee Royalty's No. 1 Boice, CSL N½ NE NE Sec. 18-1-16e. Bldg. rig to deepen to Viola lime.

Stephens & Uhri's No. 1-A Ogle, NW SE SE Sec. 9-1-14. R.T. on ground.

Stephens & Uhri's No. 1 Stauffer, SW SW NE Sec. 21-1n-13e. S.D. 475 ft.

Scotts Bluff County

Albert Wood et al's No. 1 McHenry, SE NE NE Sec. 33-23-57w. T.D. 625 ft.; S.D.

J. A. Fairy Pet.'s No. 1 McCulley, C SE SE Sec. 35-23-58w. S.D. 2,035 ft.

ARKANSAS

Arkansas County

J. M. Hazelwood et al's No. 1 L. Miller, 1,980 ft. S, 667 ft. W, NE cor. NE¼ Sec. 33-5s-4w. Set 10¾-in. csg. 537 ft.; drlg. 4,366 ft.

Clark County

J. H. Coker and J. P. Grieves' No. 1 C. McClellan, 330 ft. NW cor. NW SE Sec. 11-20-21. Set 8¼-in. csg. 43 ft.; W.O.C.

W. S. King's No. 1 N. Ross, 640 ft. S, 359 ft. W, NE cor. S½ SW Sec. 3-10-21. T.D. 2,050 ft.; S.D.; fuel.

Columbia County

Ark. Fuel Oil Co.'s No. 3-B King, 330 ft. S, 665 ft. W, NE cor. SE NW Sec. 21-17-20. Drlg. 2,226 ft.

Jas. Forgotson's No. 1 L. M. Dendy, C SW SW Sec. 24-17-19. Set 13⅜-in. csg. 120 ft.; set 9⅝-in. csg. 2,235 ft.; drlg. 5,745 ft.

Hassie Hunt's No. 2 McWilliams, NE NE Sec. 16-18-19. 9⅝-in. csg. 2,109 ft.; set 5½-in. csg. 8,250 ft.; would not flw.; rkd. with gas and attempted acd; would not take acd.; drld. to 8,265½ ft.; installed flow valves; no results; pulling valves to deepen.

Hunt Oil Co.'s No. 1 E. Garner, C N½ NE NE Sec. 25-17-20. and N½ NW NW Sec. 30-17-19. R.U.

McAlester Fuel Oil Co.'s No. 1 H. Sayers unit, C NE NW Sec. 15-18-22. Set 9⅝-in. csg. 4,060 ft.; drlg. rd. sdy. sh. 7,336 ft.

Mid-Continent Pet. Corp. et al's No. 1 R. S. Foster, 100 ft. N, C SE SW Sec. 24-17-20. Drlg. 7,226 ft.

Normandie Oil Corp.'s No. 1 D. R. Booth, C N½ NE NW and N½ NW NE Sec 25-17-20. Drlg. 5,980 ft.

Shell Oil Co., Inc.'s No. 2 Peoples Bnk. of Columbia, C SW SW Sec. 24-17-20. Drlg. 6,120 ft.

Standard Oil Co. of La.'s No. 1-B Gunnels et al, 560 ft. N, 660 ft. E, SW cor. NW NW Sec. 20-17-19. Set 9⅝-in. csg. 2,204 ft.; W.O.C.

Tide Water Asso. Oil Co. and Seaboard Oil Corp.'s No. 1 W. T. Beene, C NE NW Sec. 14-18-19. Spd.

Tide Water Asso. Oil Co. and Seaboard Oil Corp.'s No. 2 J. T. Beene, C NE NW Sec. 15-18-19. Set 13¾-in. csg. 139 ft.; will not flow; S.I.; T. por. 8,234 ft.; T.D. 8,247 ft.

Tide Water-Seaboard Oil Co.'s No. 1 W. Mack, C SW NE Sec. 16-18-19. Cg. 8,275 ft.

G. H. Vaughn's No. 1-D J. Jones, 495 ft. S, 660 ft. W, NE cor. NE SE Sec. 21-17-20. T.D. 7,634 ft.; set 6-in. csg. 7,600 ft. (cor.); flwd. 154 bbl.; ¼-in. ck.; C.P. 400 lb.; T.P. 750 lb. and went dead; swbg. to test.

G. H. Vaughn et al's No. 1 Mahoney, C NW NW Sec. 13-18-19. Drlg. 2,217 ft.

Craighead County

Tennark, Inc.'s No. 1 R. M. Martin, SE cor. NE NE Sec. 35-14-3e. T.D. 5,092 ft.; ran electric log; S.D.; hd. L.

Lonoke County

Lunnon Howell & Ford's No. 1 City of Cabot, C NE Lot 1, Blk. 6, Sec. 18-4n-9w. Set 4½-in. csg. 878 ft.; T.D. 900 ft.; reported S.O.; prep. test.

J. F. Russell's No. 1 J. T. Gunter, 440 ft. N, 577 ft. W, SE cor. Sec. 17-5n-10w. Drld. sd. S.S.O. 2,231-45 ft.; drlg. sd., strks. sh. 2,247 ft.

Miller County

Skelly Oil Co. and Pacific Western Oil Corp.'s No. 1 E. C. Wallis, C S½ SE SE Sec. 7-20-27. Set 9-in. csg. 1,948 ft.; drlg. L.&sh. 5,825 ft.

Standard Oil Co. of La.'s No. 1 W. P. Sturgis, 660 ft. S and W. C Sec. 1-17-27. Set 9⅝-in. csg. 2,497 ft.; T. anhy. 4,800 ft.; B. anhy. cd. por. ool. L. 5,219-37 ft.; D.S.T. incr. S.W.; cg. 5,282 ft.

Nevada County

Berry Asphalt Co.'s No. 9 Groves Ld. & Tmbr. Co., 330 ft. S and W. C Sec. 10-14-20. Set 10-in. csg. 28 ft.; 500 ft. F.I.H.; W.O.S.R.; T.D. 1,266 ft.; C.O.

Velma Oil Co.'s No. 1 T. M. Bemis, 330 ft. NW cor. NW NE Sec. 23-10s-22w. Set 10-in. csg. 66 ft.; S.D. 68 ft.

Ouachita County

Liberty Oil Co.'s No. 1 P. T. Hildebrand, 660 ft. S, 330 ft. W, NE cor. SE¼ Sec. 28-15-15. O.W.W.O.; O.T.D. 4,934 ft.; reperf. csg. 2,600-25 ft.; tstd. S.W. and recmtd. perf.; arng. reperf.; T.D. 2,784 ft.; M.I.C.T.

Saline County

A. W. Givens' No. 1 Williams, 375 ft. S, 420 ft. E, NW cor. NE NE Sec. 18-3s-15w. Drlg. L.&sh. 406 ft.

Sevier County

R. A. McArthur's No. 1 Bell est., 20 ft. SE cor. SE SW Sec. 29-9s-32w. S.D. 732 ft.

St. Francis County

D. T. Hargraves et al's No. 1 J. T. Wellford, 400 ft. N, 300 ft. W, SE cor. NE NE Sec. 29-4n-1w. R.U.

Union County—Schuler

Delta Drlg. Co.'s No. 1 J. C. Morgan, 330 ft. S and W. C Sec. 13-18-18. Set 9⅝-in. csg. 1,537 ft.; drlg. 4,800 ft.

Union County—Other

Berg & Laney's No. 1 Cutrer, 150 ft. N, 660 ft. W, SE cor. NW SW Sec. 21-17-14. Cd. 2,727-28 ft.; rec. 7-in. por. sd.; cd. 2,728-35 ft.; rec. 7½ ft. soft por. sd., saltv taste; drlg. by fish 350 ft.; T.D. 3,370 ft.; set 5½-in. csg. 2,771 ft.; perf. 2,702-05 ft.; bailed down 1,000 ft. and tstd. S.W.; prep. recmt. perf.

Fohs Oil Co.'s No. 1 Grace, C SE SW SE Sec. 31-17-14. Spd.

Kinard Curtis et al's No. 1 J. A. Kelly, 330 ft. SW cor. SE SW SW Sec. 9-17-14. Set 10-in. csg. 203 ft.; S.D.; 1,820 ft.; rig repair.

McCreesien Oil Co.'s No. 3 J. C. Parker, 250 ft. N, 400 ft. E, SW cor. Sec. 3-18-13. R.U.

LOUISIANA

NORTH LOUISIANA

Bossier Parish

Gulf Ref. Co.'s No. 20 C. B. Hodges, 3,131 ft. N, 1,388 ft. W, SE cor. Sec. 24-16-12. T. Pett. L. 5,298 ft.; T. Trv. Pk. 5,590 ft.; D.S.T. 8,261-93 ft.; tstd. 220 ft. mud; T.D. 8,647 ft.; no show; P.B. 1,640 ft. to clk.; perf. 1,550-62 ft.; W.O.S.R.

Premier Dev. Co.'s No. 1 Mehaffey, 150 ft. S, 1,980 ft. W, NE cor. Sec. 27-19-11. Set 12½-in. csg. 155 ft.; W.O.C.

Triangle Drlg. Co.'s No. 1 Chatman, Sec. 18-18-11. Set 8⅝-in. csg. 2,401 ft.; T.D. 3,100 ft.; acdz. with 2,500 gal.; tstg.

Triangle Drlg. Co.'s No. 2 Chatman, 1,977 ft. E, 1,995 ft. S, NW cor. Sec. 18-17-11. Drlg. 3,136 ft.

Union Prod. Co.'s No. 2-B Thigpen & Herold, 1,245 ft. S, 1,388 ft. E, NW cor. Sec. 19-17-11. Drlg. 2,665 ft.

Caddo Parish

Baker & Wiasman's No. 1 Muslow, Sec. 31-21-15. R.U.

Beaudon & Griffin's No. 1 Davidson, Sec. 26-21-16. R.U.

F. W. Burford's No. 2 Atkins, Sec. 5-23-15. 9⅝-in. csg. 850 ft.; drlg. L. 6,007 ft.

L. M. Calhoun's No. 1 Crawford, Sec. 32-21-15. R.U.

Hugh Carney's No. 2 Burton, Sec. 1-20-16. Set 10-in. csg. 40 ft.; drlg. 250 ft.

D. T. Caubie's No. 1 Darnell, Sec. 17-22-16. Set 10-in. csg. 80 ft.; T.D. 2,800 ft.; rng. electrical log.

Davidson & Brown's No. 1 Wells, Sec. 10-21-15. Set 8-in. csg. 1,597 ft.; acd. with 4,000 gal.; pmpd.; S.O. 1,789 ft.; cg. 2,447 ft.

Duncan & Harrison's No. 1 Carter, Sec. 9-21-16. Set 10-in. csg. 42 ft.; set 7-in. csg. 1,058 ft.; tstd. dry 1,072 ft.; drlg. sh.&sd. 2,045 ft.

Galbraith & Mealey's No. 20 Raines, Sec. 22-21-15. Set 6⅝-in. csg. 1,474 ft.; T.D. 1,625 ft.; will acd.

L. O. Gandy's No. 1 Etchinson, Sec. 11-20-16. Set 10-in. csg. 40 ft.; drlg. sdy. sh. 1,345 ft.

J. H. Hooker's No. 1 Muslow, Sec. 5-20-15. T.D. 1,427 ft.; stk. 6-in. csg. 1,313 ft.

Kendricks & Bashaw's No. 1 Huckaby-Parker, Sec. 14-22-16. T.D. 1,616 ft.; ran electrical log; W.O.

R. Manziel et al's No. 2 City of Shreveport, Sec. 35-18-14. R.U.

J. Ray Murray's No. 1 Chesire, Sec. 32-21-15. Set 6⅝-in. csg. 1,398 ft.; T.D. 1,592 ft.; W.O.C.

J. S. Pate et al's No. 1 Querbes, Sec. 18-21-15. Drlg. sh.&sd. 1,325 ft.

Providence Oil Co.'s No. 6 Bostwick, Sec. 13-22-16. Set 10-in. csg. 105 ft.; W.O.C.

Stanolind O. & G. Co.'s No. 2 Alexander, 670 ft. E, 2,461 ft. S, NW cor. SE Sec. 21-21-15. Acd. with 3,000 gal.; T.D. 1,750 ft.; W.O.S.R.

Stanolind O. & G. Co.'s No. 4 Noel, Sec. 24-21-15. Drlg. sh. 710 ft.

Jack Terrell's No. 1 Welch, Sec. 3-20-16. Set 6-in. csg. 946 ft.

Texas Co.'s No. 6 La. Co. fee, Sec. 1-20-16. Set 6⅝-in. csg. 1,328 ft.; T.D. 1,335 ft.; W.O.C.

Sloan Wells' No. 1 Stiles, 3,734 ft. N, 1,706 ft. E, SW cor. Sec. 32-21-16. Set 10-in. csg. 340 ft.; set 6⅝-in. csg. 2,298 ft.; W.O.C.

Ivan W. Wright's No. 1 Moore, Sec. 1-20-16. Set 10-in. csg. 40 ft.; T.D. 1,345 ft.; S.D.; will set csg.

Claiborne Parish

Tiki Expl. Co.'s No. 1 J. L. Moss, NE SE Sec. 11-22-8. M.I.M.

De Soto Parish

Dewey Juan's No. 1 Frost Lbr. Ind., 600 ft. SE cor. SW¼ Sec. 14-22-3e. T. D. 2,949 ft.; bailed down 2,300 ft.; S. S.O.; tstd. S.S.O.&S.W.; cd. to 2,938 ft. (cor.) and S.D.; rig repairs.

Watts O. & G. Co.'s No. 1 Frank Gro. Co., 338 ft. S, 450 ft. W, NE cor. NW Sec. 35-12-11. Br. sd. 2,503-2,634 ft.; set 6-in. csg. 2,503 ft.; T.D. 2,634 ft.; W.O.C.

La Salle Parish

Georgetown Oil Co.'s No. 4 Baldridge, 300 ft. S, 250 ft. E, NW cor. NE NW Sec. 11-9-1e. Set 10-in. csg. 60 ft.; drlg. sh. 1,448 ft.

H. L. Hunt and Ark. Fuel Oil Co.'s No. 1 Goodpine Lbr. Co., C NW NW Sec. 18-10n-3e. Fsg. 3,030 ft.; blew out and bridged at 1,200 ft.; drld. bridge and twisted off 2,000 ft. D.S.; left wall hook in hole while fsg.; P.B. 900 ft.; whpstk. 900 ft.; ran Schlmb. to 3,039 ft.; T.D. 8,997 ft.; P.B. 4,863 ft.; set 5½-in. csg.; W.O.C.

Placid Oil Co.'s No. 9 Cent. La., 810 ft. S, 150 ft. W, NE cor. Sec. 13-10-2e. Cd. 2,884-2,903 ft.; soft, gr. por. sd.; S.O.; sd. 2,397-2,409 ft.; S.O.; set 5½-in. csg. 2,396 ft.; T.D. 2,401 ft.; O.T.D. 2,993 ft.; tstd. 3,000,000 cu. ft. gas and 600 bbl. S.W.; S.S.O. through ¾-in. ck.; T.P. 200 lb.

Madison Parish

Gulf Ref. Co.'s No. 1 Sondheimer, 175 ft. N, 35 ft. W, C Sec. 33-18-12e. Spd.; set 13⅜-in. csg. 169 ft.; drlg. 3,910 ft.

Morehouse Parish

Southern Carbon Co.'s No. 28 Tensas, 1,333 ft. N, 1,263 ft. W, SE cor. Sec. 10-21-4e. Drlg. 75 ft.

Natchitoches Parish

J. E. Watts' No. 1 Tanner est., 330 ft. SW cor. NW¼ Sec. 18-10-10. Set 10-in. csg. 60 ft.; W.O.C.

Sabine Parish

A. R. Chestnut's No. 1 Logan, 330 ft. SW cor. NW NW Sec. 26-10-13. Drlg. 40 ft.

R. Chestnut's No. 1 Walden, 330 ft. SE cor. NE NE Sec. 27-10-13. Set 10-in. csg. 42 ft.; set 7-in. csg. 1,458 ft.; T.D. 2,006 ft.; pmpd. S.W.; S.O.; W.O.S.R.

N. B. Livingston's No. 1 Bowman Hicks, 660 ft. SE cor. SW Sec. 36-9-14. Set 10-in. csg. 110 ft.; D.S.T. 3,125-59 ft.; ¼-in. cks. T.&B.; 35 min.; rec. 150 ft. mud and S.G.; rng. 5½-in. csg. 3,508 ft., T.D.; tstd. gas 3,462-3,535 ft.; perf. between 3,134 ft. and 3,462 ft. and tstd. est. 1,000,000 cu. ft. gas, S.O., and S.W.; P.B. 3,200 ft.; tstd. S.W.; S.O. 3,134-50 ft.; acd. with 1,500 gal.; tstd. S.W. and 50 B.O.; T.D. 3,170 ft.; W.O. S.R.

Major Oil Co.'s No. 2 Sabine, 330 ft. SE cor. SE SW Sec. 5-7-13. Set 7-in. csg. 2,061 ft.; T.D. 2,475 ft.; W.O.S.R.

Geo. L. Pace's No. 1 Logan Oil Co., 390 ft. S, 300 ft. E, NW cor. SW Sec. 26-10-13. Set 10-in. csg. 100 ft.; W.O.C.

J. H. Thames' No. 1 Long Bell, 330 ft. SW cor. NE SE Sec. 5-8-13. T.D. 1,708 ft.; set 7-in. csg. 1,680 ft.; did not tst. 1,708 ft.; T.D. 1,987 ft.; acd. with 1,000 gal.; tstg. 1,987 ft.

Union Parish

Memphis Nat. Gas Co.'s No. 1 Barr, Sec. 3-21-2. R.U.

Memphis Nat. Gas Co.'s No. 1 J. B. Lankford, Sec. 10-21-3. Set 12½-in. csg. 165 ft.; W.O.C.

Webster Parish

Hassie Hunt's No. 2 Coyle, C SW SE Sec. 22-21-10. No Hllwy. sd.; P.B.; set 5,918 ft.; T.D. 6,294 ft.; tstd. good S. O.; S.D.; W.O.

Hunt Oil Co.'s No. 1 Gaines, 50 ft. NW C NW NE Sec. 30-21-9. Set 9⅝-in. csg. 5,615 ft.; no Hllwy. sd.; D sd. 8,501-05 ft. (oil); T.D. 8,671 ft.; set csg. 8,668 ft.; W.O.C.

Hunt Oil Co.'s No. 1 Jordan, 660 ft. N, 560 ft. W, SE cor. NE Sec. 31-21-10. No Hllwy. sd.; T.D. 8,551 ft.

Hunt Oil Co.'s No. 1 Robt. Scott, C SE SE Sec. 19-21-9. R.U.

Hunt Oil Co.'s No. 5 Stewart, 660 ft. N, 560 ft. E, SW cor. NW¼ Sec. 29-21-10. Set 9⅝-in. csg. 5,610 ft.; drlg. hd. sd. 8,017 ft.

Midstates Oil Corp.'s No. 1 Brenner-Beamsley unit, 100 ft. SE cor. SW SE Sec. 20-21-10. Drlg. 4,210 ft.

Quad Oil Co.'s No. 3 Gray, 105 ft. SE cor. NE SE Sec. 27-21-10. Set 13⅜-in. csg. 640 ft.; drlg. sh. 4,619 ft.

SOUTH LOUISIANA FIELDS

Abbeville—Vermilion Parish

Continental Oil Co.'s No. 1 Boudoin, Sec. 64-12s-3e. 13⅜-in. csg. 1,776 ft.; drlg. sh. 7,026 ft.

Continental Oil Co.'s No. 1 Motty, Sec. 18-12s-3e. T.D. 10,444 ft.; sdtrkd.; perf. csg. 9,804-11 ft.; I.P. 267 bbl., 17 hrs.; ¼-in. ck.

Anse La Butte—St. Martin Parish

Glassell & Glassell's No. 2 Breaux, Sec. 118-9s-5e. Cg. sd.&sh. 4,940 ft.

Glassell & Glassell's No. 1 Moresi, Sec. 121-9s-5e. Drlg. sd.&sh. 2,510 ft.

Iberia Pet. Co.'s No. 1 A. P. Moresi, Sec 118-9s-5e. T.D. 2,470 ft.; 5½-in. csg. 2,440 ft.; I.P. 11 B.P.H.; 12/64-in. ck.

Emer Line Oil Co.'s No. 1 Nickerson, Sec. 86-9s-5e. T.D. 2,634 ft.; P.B. 1,000 ft.

Bancroft—Beauregard Parish

Republic Prod. Co.'s No. 15 Columbia Ld. Co., Sec. 21-6s-13w. T.D. 7,295 ft.; I.P. 252 B.P.D.; ¼-in. ck.

Barataria—Jefferson Parish

California Oil Co.'s No. 1 Danciger-State, Sec. 2-16s-23e. Loc.

California Oil Co.'s No. 1 State-Bayou Twp. 16-23e. 10¾-in. csg. 2,002 ft.; drlg. sh. 5,571 ft.

California Oil Co.'s No. 1 Zeringue-Community, Sec. 2-16s-23e. T.D. 8,275 ft., S.W. sd.; T. sd. 8,250 ft.; to sdtrk.

Carter, Perrin & Brian's No. 1 Ruttley Wiseman, Sec. 2-16s-23e. T.D. 8,621 ft.; prep. to dpn.

Geo. Conover's No. 1 Conover Community, Sec. 22-15s-23e. Loc.

Fohs Oil Co.'s No. 1 Conzelman, Sec. 22-15s-23e. Loc.

Bateman Lake—St. Mary Parish

Texas Co.'s No. 3 State, Sec. 16s-12e. 7-in. csg. 10,970 ft.; cg. sh. 11,432 ft.

Texas Co.'s No. 3 Wax Bayou, Sec. 21-16s-12e. 7-in. csg. 10,984 ft.; T.D. 11,127 ft.; rec. 275 ft. of oil 10,879-10,900 ft.; D.S. stk.; fsg.

Baton Rouge—East Baton Rouge Parish

Guaranty Oil Co.'s No. 2 Morgan, Sec. 65-7s-1w. T.D. 6,530 ft.; 5½-in. csg. 6,450 ft.; swbd. S.W.; cleaning hole with reversing tool.

Wm. Helis' No. 8 Nelson, Sec. 36-7s-1w. T.D. 6,477 ft.; 7-in. csg. 6,466 ft.; I.P. 240 B.P.D.; 10/64-in. ck.

Lisbon Iberia Oil Corp.'s No. 3 University Hills subd., Sec. 68-7s-1w. Drlg. sh. 4,510 ft.

Sugarfield Oil Co.'s No. 2 McDonald Community, Sec. 46-7s-1e. T.D. 7,220 ft.

Bay St. Elaine—Terrebonne Parish

Texas Co.'s No. 3 L.L.&E., Sec. 18-22s-18e. 7-in. csg. 6,000 ft.; drlg. sh. 6,669 ft.

Bayou Blue—Iberville Parish

T. G. Markley and Crosby Drlg. Co.'s No. 1 Baiste, Sec. 74-9s-10e. Loc.

Superior Oil Co.'s No. 2 Schwing Lbr. & Shingle Co., Sec. 74-9s-10e. T. salt 7,006 ft.; T.D. 7,011 ft., salt; 6-in. csg. 7,000 ft.

Bayou Choctaw—Iberville Parish

Standard Oil Co. of La.'s No. 2 Cypress, Sec. 28-8s-11e. 10¾-in. csg. 2,250 ft.; drlg. sh. 7,559 ft.

Bayou des Glaize—Iberville Parish

Humble O. & R. Co.'s No. 2-B Wilberta, Sec. 78-8s-8e. 10¾-in. csg. 2,854 ft.; T.D. 8,062 ft.; rmg.

Black Bayou—Cameron Parish

Shell Oil Co., Inc.'s No. 44 Watkins, Sec 7-12s-12w. S.D. 5,826 ft., salt; abd.

Caillou Island—Terrebonne Parish

Texas Co.'s No. 64 State, Sec. 20-23s-20e. T.D. 5,790 ft., salt; 7-in. csg. 5,682 ft. perf. csg. 5,430-80 ft.; made sqz. job.

Texas Co.'s No. 65 State, Sec. 17-23s-20e Drlg. sdy. sh. 5,924 ft.

Cameron Meadows—Cameron Parish

Magnolia Pet. Co.'s No. 27 Cameron Meadows, Sec. 21-14s-13w. Drlg. sh. 5,020 ft.

Chacahoula—La Fourche Parish

Sun Oil Co.'s No. 1 Cypress, Sec. 75-15s-15e. 13⅜-in. csg. 1,842 ft.; T. salt 6,072 ft.; T.D. 6,088 ft.; P.B. 2,100 ft.; sdtrkd.; T.D. 6,553 ft.; fsg.; sdtrkd.; T.D. 5,544 ft.; P.B. to sdtrk.; T.D. 7,271 ft.; sdtrkd.; T.D. 7,426 ft.; P.B 4,075 ft.; abd.

Sun Oil Co.'s No. 7 Dibert, Stark & Brown Cypress Co., Sec. 70-15s-15e Drlg. sdy. sh. 7,080 ft.

Chalkley Field—Cameron Parish

Humble O. & R. Co.'s No. 6 Hanzen, Sec. 9-12s-6w. Drlg. sh. 8,550 ft.

Shell Oil Co., Inc.'s No. 1 Coastal Club. Drlg. sh. 1,751 ft.

Shell Oil Co., Inc.'s No. 6 Hanzen, Sec 21-12s-6w. T.D. 8,951 ft.; well went to S.W.; P.B. 8,940 ft.; P.B. 8,868 ft.; I.P. 270 B.P.D.; 9/64-in. ck.

Shell Oil Co., Inc.'s No. 7-A Hanzen, Sec. 20-12s-6w. R.U.

Shell Oil Co., Inc.'s No. 1 Sweet Lake. Drlg. sh. 1,350 ft.

Cheneyville—Rapides Parish

S. W. Richardson's No. 10 Well, Sec. 54 1s-2e. T.D. 5,782 ft.; 5½-in. csg. 5,749 ft.; perf. csg. 5,660-88 ft.

Darrow—Ascension Parish

Humble O. & R. Co.'s No. 3-B Community, Sec. 47-10s-2e. Drlg. sh. 4,571 ft.

Humble O. & R. Co.'s No. 28 Community Sec. 30-10s-2e. T.D. 4,649 ft.; 7-in. csg. 4,637 ft.; I.P. 324 B.P.D.; 13/64-in. ck.

Humble O. & R. Co.'s No. 29 Community. Sec. 30-10s-2e. Loc.

Kiva Oil Co.'s No. 1 Duplessis, Sec. 69-10s-2w. S.D. 2,523 ft.

Dog Lake—Terrebonne Parish

Texas Co.'s No. 11 State, Sec. 32-21s-16e 10¾-in. csg. 1,751 ft.; T.D. 6,818 ft., salt; T. salt 6,807 ft.; P.B.; sdtrkd.; T.D. 6,907 ft., salt; P.B. to sdtrk.

Texas Co.'s No. 24 State, Sec. 5-22s-16e. Loc.

Edgerly—Calcasieu Parish

Emerson Oil Corp.'s No. 3 Stanolind fee Sec. 28-9s-11w. Drlg. 500 ft.

Eola—Avoyelles Parish

Amerada Pet. Corp.'s No. 3 Avoyelles, Sec. 5-2s-3e. Drk.

Amerada Pet. Corp.'s No. 1 Sam Cerami, Sec. 6-2s-3e. Drlg. sh. 1,769 ft.

Amerada Pet. Corp.'s No. 2 Cerami, Sec. 6-2s-3e. Loc.

Amerada Pet. Corp.'s No. 1-A Dent, Sec. 10-2s-2e. T.D. 8,574 ft.; tstg.

Amerada Pet. Corp.'s No. 3 Dent, Sec. 10-2s-2e. T.D. 8,575 ft.; perf. csg. 8,530-47 ft.; I.P. 583 B.P.D.; ¼-in. ck.

Amerada Pet. Corp.'s No. 3 Irion, Sec. 6-2s-3e. R.U.

Amerada Pet. Corp.'s No. 1 Knoll, Sec. 6-2s-3e. Loc.

Amerada Pet. Corp.'s No. 1 Monchau, Sec. 1-2s-2e. T.D. 8,573 ft.; perf. csg. 8,555-71 ft.; I.P. 678 bbl.; ¼-in. ck.

Amerada Pet. Corp.'s No. 4 Whitlow, Sec. 1-2s-2e. Drlg. sh. 8,420 ft.

Hany Bass & Lake's No. 1 Ritchie Grocery, Sec. 3-1s-3e. Drlg. sh. 1,530 ft.

Gulf Oil Corp.'s No. 2 Mouliere, Sec. 1-2s-2e. Drlg. sh. 4,530 ft.

G. R. Kenedy's No. 1 Josie Hudson, Sec. 1-2s-2e. Drlg. sh. 6,250 ft.

Magnolia Pet. Co.'s No. 1 O. Q. Foster, Sec. 6-2s-3e. Drlg. 4,426 ft.

S. W. Richardson's No. 10 Haas Inv. Co., Sec. 7-2s-3e. T.D. 8,576 ft.; tstg.

S. W. Richardson's No. 11 Haas Inv. Co., Sec. 7-2s-3e. R.U.

Fausse Point—Iberia Parish

Sun Oil Co.'s No. 1 Planters Lbr. Co., Sec. 27-11s-8e. 10¾-in. csg. 1,424 ft.; drlg. sh. 1,428 ft.

Texas Co.'s No. 7 State, Sec. 35-11s-8e. Drlg. sh. 1,350 ft.

Garden Island—Plaquemines Parish

Texas Co.'s No. 42 State, Sec. 38-23s-33e. Cg. sd. 4,854 ft.

Texas Co.'s No. 43 State, Sec. 38-23s-33e. Drlg. sh.&L. 3,728 ft.

Gibson—Terrebonne Parish

Shell Oil Co., Inc.'s No. 8 Pelican, Sec. 35-17s-15e. Drlg. sh. 9,372 ft.

Gillis—Calcasieu Parish

Fohs Oil Co.'s No. 2-A M. P. Erwin, Sec. 14-9s-8w. Drlg. sh. 5,980 ft.

Golden Meadow—La Fourche Parish

Bateman Drlg. Co.'s No. 1 Harry Louviere, Sec. 9-19s-22e. T.D. 5,560 ft.; 5½-in. csg. 5,260 ft.; perf. csg. 5,150-80 ft.; S.D.

Bennett O. & R. Co.'s No. 3 Authement, Sec. 12-19s-22e. T.D. 4,241 ft.

Bennett O. & R. Co.'s No. 1 Philozate, Sec. 12-19s-22e. T.D. 8,605 ft.; perf. csg. 8,360-8,400 ft.; blew out, flwg. oil and gas.

Berkshire Oil Co.'s No. 2 Malgom, Sec. 2-19s-22e. T.D. 2,666 ft.; 7-in. csg. 2,638 ft.

Berkshire Oil Co.'s No. 14 Nicol, Sec. 9-19s-22e. R.U.

Brown & Woods' No. 1 S. Hogan, Sec. 9-19s-22e. T.D. 2,710 ft.; P.B. to 1,500 ft.; sdtrkd.; T.D. 2,672 ft.; 7-in. csg. on bttm.; perf. csg. 2,650-65 ft.; would not flow; S.D.

Taylor Fithian's No. 1 Cheramie, Sec. 12-19s-22e. Loc. abd.

Wm. Helis' No. 3 Gaspard, Sec. 9-19s-22e. 6-in. csg. 2,655 ft.; T.D. 2,664 ft.; acd.; installed gas lift.

M. H. Marr et al's No. 2 B. & D. unit, Sec. 17-19s-22e. Loc.

M. H. Marr et al's No. 4 Adam Terrebonne, Sec. 9-19s-22e. 10¾-in. csg. 670 ft.; T.D. 5,175 ft.; 5½-in. csg. 5,160 ft.; I.P. 200 B.P.D.; 12/64-in. ck.

Martex Oil Co.'s No. 3-A Rebstock, Sec. 2-19s-22e. T.D. 2,665 ft.; 5-in. csg. 2,665 ft.; perf. csg. 2,630-62 ft.; would not flow; S.D.

Martex Oil Corp.'s No. 4-A Rebstock, Sec. 2-19s-22e. Drlg. sh. 4,417 ft.

S. Rhodes Drlg. Co.'s No. 4 Falgout Holding, Sec. 9-19s-22e. T.D. 5,210 ft.; 6⅝-in. csg. 5,210 ft.; perf. csg. 5,155-67 ft.; I.P. 216 B.P.D.; 12/64-in. ck.

Fred Shield's No. 1 Lafont, Sec. 2-19s-22e. 10¾-in. csg. 103 ft.; S.D.; abd.

Terouche Oil Co.'s No. 2 Cheramie, Sec. 12-19s-22e. Drk.

Texas Co.'s No. 10 Golden Meadow, Sec. 78-19s-21e. 10¾-in. csg. 765 ft.; cg. sd. 5,534 ft.

Texas Co.'s No. 12 Golden Meadow, Sec. 78-19s-21e. Loc.

Texas Co.'s No. 3 La Terre Co., Sec. 1-20s-21e. T.D. 5,673 ft.; sdtrkd.; T.D. 10,472 ft.; 7-in. csg. 10,472 ft.; perf. csg. 10,365-88 ft.

Texas Co.'s No. 5 La Terre, Sec. 2-20s-21e. Loc.

Texas Co.'s No. 7 State-Catfish, Sec. 2-20s-21e. Loc.

Grand Bay—Plaquemines Parish

Gulf Oil Corp.'s No. 7-A Grand Prairie Lv. Dist., Sec. 5-20s-19e. Loc.

Gulf Oil Corp.'s No. 8-A Grand Prairie Dist., Sec. 5-20s-19e. Loc.

Gulf Oil Corp.'s No. 4 State QQ, Sec. 5-20s-19e. Drlg. sh. 8,050 ft.

Gulf Oil Corp.'s No. 4 State, Sec. 20-19s-19e. Drlg. sh. 6,520 ft.

Gulf Oil Corp.'s No. 5 State QQ, Sec. 31-19s-19e. Loc.

Texas Co.'s No. 1 State-Lookout Pass, Sec. 48-20s-18e. Drlg. sdy. sh. 2,030 ft.

Gulf Oil Corp.'s No. 1 State QQ, Sec. 6-20s-19e. Drlg. sh. 9,606 ft.

Grand Lake—Cameron Parish

Amerada Pet. Corp.'s No. 4 State, Twp. 13s-4w. R.U.

Amerada Pet. Corp.'s No. 5 State, Twp. 13s-14w. T.D. 9,657 ft.; P.B. 8,440 ft.

Superior Oil Co.'s No. 8 State-Lake, Twp. 13s-4w. T.D. 8,991 ft.; 6-in. csg. on bttm.

Hackberry—Cameron Parish

Harrison & Abercrombie's No. 1 Doiron, Sec. 37-12s-10w. 10¾-in. csg. 1,441 ft.; T.D. 7,325 ft.; tstg.

Stanolind O. & G. Co.'s No. 21-A Cameron Sch. Bd., Sec. 16-12s-10w. Drlg. sh. 9,315 ft.

Stanolind O. & G. Co.'s No. 31 Gulf Ld., Sec. 25-12s-11w. Drk.

Superior Oil Co.'s No. 9 Benson Vincent, Sec. 30-12s-10w. 9⅝-in. csg. 950 ft.; drlg. sh. 7,120 ft.

Texas Co.'s No. 17-B State, Twp. 12s-9w. T.D. 6,850 ft.; 5-in. csg. 6,790 ft.; perf. csg. 6,690-6,737 ft.; W.O.S.R.

Texas Co.'s No. 29-B State, Twp. 12s-9w. T.D. 8,470 ft.; 7-in. csg. 7,032 ft.

Happytown—Iberville Parish

Shell Oil Co., Inc.'s No. 1 Schwing Lbr. & Shingle Co., Sec. 85-7s-8e. Drlg. L. 8,217 ft.

Horseshoe Bayou—St. Mary Parish

Texas Co.'s No. 4 State, Sec. 23-17s-9e. Drlg. sh. 5,765 ft.

Jefferson Island—Iberia Parish

Texas Co.'s No. 4 Jefferson Island Salt, Sec. 58-12s-5e. 7⅝-in. csg. 8,494 ft.; T.D. 8,646 ft.; well trying to blow out.

Texas Co.'s No. 3 State, Twp. 12s-5e. Drlg. sh.&L. 7,450 ft.

Jennings—Acadia Parish

Brown & Sisson's No. 1 Arnaudet, Sec. 47-9s-2w. T.D. 1,938 ft.; perf. csg. 1,820-30 ft.; I.P. 40 B.P.D.; pmpg.

Glassell-Glassell's No. 8 McFarlain, Sec. 41-9s-2w. Drk.

Glassell-Glassell's No. 8 Trusher, Sec. 47-9s-2w. T.D. 9,165 ft.; sdtrkd.; 7-in. csg. 8,750 ft.; T. salt 10,735 ft.; T.D. 10,766 ft.; abd.

Gulf Oil Corp.'s No. 42 Arnaudet, Sec. 47-9s-2w. 7-in. csg. 7,961 ft.; T.D. 7,983 ft.; pulled tbg. in two; fsg.

Shell Oil Co., Inc.'s No. 10 Community, Sec. 40. Drlg. sh. 5,046 ft.

Stanolind O. & G. Co.'s No. 117 Crowley O. & Min. Co., Sec. 48-9s-2w. Drlg. sd. &L. 5,117 ft.

Stricker-Pharis et al's No. 1 Gulf fee, Sec. 45-9s-2w. 16-in. csg. 60 ft.; T.D. 7,251 ft.; rmg.

Lafitte—Jefferson Parish

Texas Co.'s No. 15 Lafitte, Sec. 20-17s-24e. T.D. 10,135 ft.; 7-in. csg. 10,123 ft.; perf. csg. 8,730-35 ft.; made sqz. job.

Texas Co.'s No. 16 L.L.&E., Lafitte, Sec. 17-17s-24e. Loc.

Texas Co.'s No. 6-A Madison Realty Co., Sec. 17-17s-24e. Dredge canal.

Texas Co.'s No. 13 Rigolet Cooperative Fur Co., Sec. 29-17s-24e. Drlg. sh. 6,937 ft.

Texas Co.'s No. 3 State, Bayou Norman, Sec. 21-17s-24e. Cg. sdy. sh. 10,135 ft.

La Fourche Crossing—La Fourche Parish

Lisbon-Iberia Oil Co.'s No. 1 Prosper Thibodaux, Sec. 17-15s-17e. Loc.

Milton Oil Co.'s No. 2 Martinez, Sec. 132-15s-17e. 11¾-in. csg. 2,687 ft.; T.D. 4,904 ft.; P.B. 4,700 ft.; T.D. 10,998 ft.; 5½-in. csg. 10,042 ft.; perf. csg. 10,029 ft.; tstg.

Lake Hermitage—Plaquemines Parish

Gulf Oil Corp.'s No. 11 La Fourche Basin Lv. Dist., Sec. 11-18s-25e. P.B. 1,395 ft. ;sdtrkd.; T.D. 3,731 ft.

Lake Mongoulois—St. Martin Parish

Texas Co.'s No. 8 State, Sec. 10-10s-9e. Drk.

Lake Pelto—Terrebonne Parish

Texas Co.'s No. 30 Lake Pelto, Sec. 7-23s-18e. T.D. 5,271 ft., salt; sdtrkd.; T. salt 5,243 ft.; P.B. 3,119 ft.; T.D. 5,572 ft.; P.B.; sdtrkd.; drlg. sd.&sh. 4,000 ft.

Texas Co.'s No. 31 State, Sec. 8-23s-18e. Loc.

La Place—St. James Parish

Pan American Prod. Co.'s No. 1 Godchaux Sugars, Sec. 97-11s-7e. 10¾-in. csg. 2,814 ft.; drlg. sh.&L. 8,214 ft.

New Iberia—Iberia Parish

Acadian Prod. Co.'s No. 4 E. T. Weeks, Sec. 51-12s-7e. Loc.

Canal Oil Co.'s No. 3 Bernard, Sec. 54-12s-7e. T.D. 4,653 ft.; 7-in. csg. 4,436 ft.; tstg.

Wm. Helis' No. 12 Bolivar, Sec. 56-12s-7e. T.D. 1,204 ft.; 7-in. csg. 1,002 ft.; W.O.S.R.

Wm. Helis' No. 1-A Bullock, Sec. 25-12s-7e. Drlg. sh. 4,056 ft.

Wm. Helis' No. 9 Schwing, Sec. 56-12s-7e. T.D. 855 ft.; 7-in. csg. 825 ft.; W. O.S.R.

Wm. Helis' No. 10 Schwing, Sec. 56-12s-7e. Drlg. sdy. sh. 5,988 ft.

Texas Co.'s No. 2 Bryant, Sec. 25-12s-7e. R.U.

Texas Co.'s No. 7 Bryant, Sec. 25-12s-7e Drk.

Texas Co.'s No. 15 Duke, Sec. 26-12s-7e. T.D. 4,282 ft., salt; 7-in. csg. 4,272 ft. perf. csg. 4,000-80 ft.; I.P. 162 B.P.D.; 10/64-in. ck.

Texas Co.'s No. 17 Duhe, Sec. 26-12s-7e. Loc.

Texas Co.'s No. 2 Hebert, Sec. 25-12s-7e. T.D. 1,935 ft.; 10¾-in. csg. 1,935 ft.; drlg. sh. 6,615 ft.

Texas Co.'s No. 1 H. Perry Walet, Sec. 2-12s-7e. T.D. 9,116 ft.; 7-in. csg. 8,838 ft.; perf. csg. 7,888-7,900 ft.; W. S.R.

Texas Co.'s No. 2 Smith, Sec. 71-12s-7e Drlg. sh.&L. 8,470 ft.

North Crowley—Acadia Parish

Humble O. & R. Co.'s No. 8 Ohlenforst, Sec. 34-8s-1e. Drlg. sh. 2,035 ft.

Humble O. & R. Co.'s No. 1 Reiners Sec. 45-8s-1e. T.D. 8,991 ft.; 7-in. csg 8,990 ft.; perf. csg. 8,596-99 ft.; I.P. 747 B.P.D.; ¼-in. ck.

Humble O. & R. Co.'s No. 7 Williams, Sec. 33-8s-1e. T.D. 8,813 ft.; 7-in. csg. 8,811 ft.; perf. csg. 8,797-8,801 ft.; I.P. 779 B.P.D.; ¼-in. ck.

Paradis—St. Charles Parish

Jolly Pet. Co.'s No. 1 Matthews Oliveira, Sec. 4-14s-20e. Drlg. sh. 6,730 ft.

Texas Co.'s No. 3 L.L.&E., Paradis, Sec 8-14s-20e. 10¾-in. csg. 1,448 ft.; T.D. 10,490 ft.; 7-in. csg. on bttm.; cd. O.S. 10,188-10,256 ft.; drlg. sh. 11,567 ft.

Texas Co.'s No. 1 Sunset Realty & Planting Co., Sec. 38-14s-20e. Bldg. rd.

Plumb Bob—St. Martin Parish

Texas Co.'s No. 13 St. Martin Ld. Co., Sec. 21-8s-7e. Drlg. sdy. sh. 7,650 ft.

Port Barre—St. Landry Parish

McDannald Oil Co.'s No. 2 Futral, Sec. 20-6s-5e. T.D. 5,514 ft.; sdtrkd.; T.D. 5,581 ft.; 5½-in. csg. 5,574 ft.; tstg.

McDannald Oil Co.'s No. 1 Sibille, Sec. 7-6s-6e. Bldg. rd.

McDannald Oil Co.'s No. 2 Sibille, Sec. 7-6s-6e. Loc.

Y. D. Spill's No. 1 Gaudet, Sec. 4-6s-5e. S.D. 4,700 ft.

Texas Co.'s No. 27 Botney Bay, Sec. 4-6s-5e. T.D. 6,239 ft.; 7-in. csg. 6,236 ft.; cg. sdy. L. 6,513 ft.

Westgate-Greenland Oil Co.'s No. 1 Jeansenne, Sec. 20-6s-5e. 7-in. csg. 5,286 ft.; perf. csg.; T.D. 5,314 ft.; S.D.

Potash—Plaquemines Parish

Humble O. & R. Co.'s No. 42 Orleans Lv. Dist., Sec. 14-18s-15e. Drlg. sdy. sh. 7,193 ft.

Quarantine Bay—Plaquemines Parish

Gulf Oil Corp.'s No. 6-A Orleans Lv. Bd., Sec. 7-19s-17e, Driving piling.

Gulf Oil Corp.'s No. 12 State, Sec. 18-19s-17e. T.D. 8,562 ft.; W.O.C.

Gulf Oil Corp.'s No. 16 State, Sec. 7-19s-17e. 13⅜-in. csg. 1,598 ft.; drlg. sh.& L. 7,450 ft.

Raceland—La Fourche Parish

Amerada Pet. Corp.'s No. 5 South Coast Corp., Sec. 34-15s-19e. T.D. 6,042 ft.; fsg.

Sorrento—Ascension Parish

Sorrento Synd.'s No. 2 L. L. Bernard, Sec. 22-10s-4e. R.U.

South Jennings—Jeff Davis Parish

W. H. Collins' No. 1 Richard, Sec. 22-10s-3w. Drk.

Stanolind O. & G. Co.'s No. 1 Clare E. Landry and A. A. Hebert. T.D. 9,638 ft.; 5½-in. csg. 9,487 ft.; perf. csg. 8,895-8,905 ft.; fsg. for tbg.

Stanolind O. & G. Co.'s No. 1 Morgan, Sec. 15-10s-3w. T.D. 9,575 ft.; 5½-in. csg. on bttm.

Stanolind O. & G. Co.'s No. 1 L. Remage, Sec. 9-10s-3w. Drlg. sh.&L. 9,586 ft.

South Roanoke—Jeff Davis Parish

Continental Oil Co.'s No. 4 Sturdevant, Sec. 35-10s-4w. Bldg. rd.

Starks—Calcasieu Parish

W. T. Burton & McLean's No. 2 Industrial Lbr. Co., Sec. 29-9s-12w. R.U.

Sweet Lake—Cameron Parish

Pure Oil Co.'s No. 15 Yount-Lee, Sec. 12-13s-8w. T.D. 7,607 ft.; P.B. 7,197 ft.; 5½-in. csg. on bttm.

Valentine—La Fourche Parish

Wm. Helis' No. 6 Valentine Sugars, Inc., Sec. 2-17s-20e. Drlg. sh. 6,175 ft.

Venice—Plaquemines Parish

Tide Water Asso. Oil Co.'s No. 7 Buras Lv. Bd., Sec. 22-21s-30e. 16-in. csg. 205 ft.; drlg. sh. 8,276 ft.

Vermilion Bay—Iberia Parish

Texas Co.'s No. 4-B Vermilion Bay, Twp. 16s-15e. 11¾-in. csg. 4,454 ft.; T. salt 5,855 ft.; base sale 7,435 ft.; run csg.

Villa Platte—Evangeline Parish

Amerada Pet. Corp.'s No. 1 Leona O. Roberie, Sec. 1-4s-2e. Drlg. sh. 9,010 ft.

Continental Oil Co.'s No. 3 Corell, Sec. 36-3s-2e. T.D. 9,140 ft.; fsg.

Continental Oil Co.'s No. 6 Deville, Sec. 3-4s-2e. Loc.

Continental Oil Co.'s No. 2 B. G. Fontenot, Sec. 41-4s-2e. T.D. 9,024 ft.; I.P. 193 B.P.D.; ½-in. ck.

Continental Oil Co.'s No. 6 Fontenot, Sec. 41-4s-2e. T.D. 9,013 ft.

Continental Oil Co.'s No. 5 Haas, Sec. 44-3s-2e. Drlg. sh. 8,810 ft.

Continental Oil Co.'s No. 6 Haas, Sec. 44-3s-2e. Loc.

Continental Oil Co.'s No. 3 La Central, Sec. 46-3s-2e. Loc.

Continental Oil Co.'s No. 1 Opelousar, St. Landry, Sec. Co., Sec. 44-3s-2e. Loc.

Continental Oil Co.'s No. 1 Adam Tate, Sec. 41-4s-2e. Drlg. sh. 8,436 ft.

Continental Oil Co.'s No. 1 David Tate, Sec. 36-3s-2e. T.D. 10,235 ft.

Continental Oil Co.'s No. 1 J. E. Vidrine, Sec. 1-4s-2e. T.D. 5,637 ft.; fsg.

Danciger O. & R. Co.'s No. 2 J. E. Vidrine, Sec. 1-4s-2e. Drlg. sh. 5,824 ft.

West Gueydan—Vermilion Parish

Magnolia Pet. Co.'s No. 1 J. Hartwell, Sec. 5-12s-2w. Drlg. sh. 1,520 ft.

West Lake Verret—St. Mary Parish

Shell Oil Co., Inc.'s No. 4 Jeanerette. 7⅝-in. csg. 10,683 ft.; T.D. 11,890 ft.; P.B. 11,265 ft.

White Castle—Iberville Parish

Jolly Pet. Corp.'s No. 1 E. B. Adams, Sec. 1-11s-12e. T.D. 1,610 ft.; W.O.C.

Shell Oil Co., Inc.'s No. 1 Forest Home. Perf. csg. 6,515-40 ft.

Shell Oil Co., Inc.'s No. 16 Wilbert, Sec. 8-11s-12e. Loc.

Woodlawn—Jeff Davis Parish

Union Sulphur Co.'s No. 1 T. Miller, Sec. 6-9s-5w. Drlg. sh. 1,530 ft.

Woodlawn Oil Corp.'s No. 1 Hebert, Sec. 1-9s-6w. T.D. 9,543 ft.; 7-in. csg. 9,170 ft.; perf. csg. 9,189-93 ft.; flwd. S.W. and dist.; well flwd. 100% S.W.; plld. tbg.; set cmt. retainer at 9,175 ft.; sqzd. perf.; reperf. csg. 8,139-42 ft.; flwg. 16 bbl. dist. per day; ⅝-in. ck.; killed; perf. csg. 8,081-85½ ft.; tstg.

S. LOUISIANA WILDCATS

Acadia Parish

Humble O. & R. Co.'s No. 1 Leger, Sec. 83-8s-2e. Drlg. sh. 400 ft.

Vincent, Welch & E. J. Nicklos' No. 1 L. Ruppert, Sec. 21-7s-1w. Drlg. sh. 8,975 ft.

Assumption Parish

Falcon-Seaboard Drlg. Co.'s No. 1 Alex Simoneaux, Sec. 43-12s-13e. 18⅝-in. csg. 60 ft.; T.D. 1,905 ft.; run 11¾-in. csg.; drlg. sdy. L. 3,910 ft.

Beauregard Parish

Atlantic Ref. Co.'s No. 1 Lutcher Moore Lbr. Co., Sec. 13-5s-12w. S.D. 10,501 ft.; abd.

Atlantic Ref. Co.'s No. 1 Lutcher Moore, Sec. 22-3s-11w. Loc.

Atlantic Ref. Co.'s No. 1 Rice Ld. & Lbr. Co., Sec. 22-3s-11w. Loc.

Atlantic Ref. Co.'s No. 1 D. A. Whitmer, Sec. 26-3s-11w. 10¾-in. csg. 2,037 ft.; T. Cockfield sd. 5,684 ft.; T.D. 8,617 ft.; 5½-in. csg. 8,615 ft.

Loffland Bros.' No. 3 Long Bell Lbr. Co., Sec. 24-5s-11w. Drlg. sh. 4,386 ft.

Calcasieu Parish

Edson Pet. Co.'s No. 1 Edgwood Ld. & Logging Co., Sec. 33-7s-10w. Drlg. sh. 5,760 ft.

Cameron Parish

Phillips Pet. Co.'s No. 1 Miami Corp., Sec. 11-4s-6w. T.D. 10,195 ft.; well tried to blow out; stk. D.S.; sdtrkd. 3,775 ft.; T.D. 5,378 ft.; sdtrkd.; drlg. sh. & L. 5,108 ft.

Superior Oil Co.'s No. 1 State, Calcasieu Lake, Twp. 14s-9w. T. salt 2,382 ft.; T.D. 2,582 ft.; abd.

East Baton Rouge Parish

Farris & Golding Drlg. Co.'s No. 1 Paulet, Sec. 58-8s-1e. R.U.

Iberia Parish

Plymouth Oil Co. et al's No. 1 Lynch McHugh, Sec. 13-12s-10e. 10¾-in. csg. 2,519 ft.; T.D. 10,021 ft.; 7-in. csg. 8,268 ft.; perf. csg. 8,158-86 ft.; rec. 20 bbl. S.W.; sqzd. perf.; perf. csg. 8,052-72 ft.; I.P. 15 B.P.H.; ¼-in. ck.; grv. 35.6°.

Iberville Parish

Shell Oil Co., Inc.'s No. 1 Southwood, Sec. 20-9s-2e. Drlg. sh. 3,511 ft.

Jeff Davis Parish

Continental Oil Co.'s No. 1 Niblett, Sec. 1-11s-5w. 13⅜-in. csg. 2,085 ft.; 7-in. csg. 10,955 ft.; drlg. sh. 11,629 ft.

H. M. Naylor's No. 1 Acadia Dev. Co., Sec. 12-10s-2w. T.D. 2,190 ft.; 10¾-in. csg. 2,115 ft.; drlg. sh. 5,102 ft.

Union Sulphur Co.'s No. 1 Somson, Sec. 35-7s-4w. Drlg. sh. 7,664 ft.

Jefferson Parish

Vendome Pet. Co.'s No. 1 Coulon, Sec. 15-15s-23e. Drk.

La Fourche Parish

Ernest Cockrell's No. 1 La Fourche Ld. Co., Sec. 32-18s-22e. 10¾-in. csg. 650 ft.

Gulf Oil Corp.'s No. 1-B Bowie Lbr. Co., Sec. 69-15s-19e. Drlg. sh. 4,367 ft.

Humble O. & R. Co.'s No. 1 Caldwell Sugars, Inc., Sec. 115-14s-15e. 13⅜-in csg. 2,988 ft.; drlg. sh. 9,335 ft.

Tide Water Asso. Oil Co.'s No. 1 Delta Farms, Inc., Sec. 6-17-23e. T.D. 11,850 ft.; P.B. T.D. 11,810 ft.; perf. csg. 11,780-11,800 ft.; rec. 30 ft. of dist., 400 ft. drlg. mud; P.B. 11,325 ft.; perf. csg. 11,290-11,305 ft.; rec. S.W.; perf. csg. 11,270-80 ft.; 85 stands oil and S.W.; perf. csg. 8,908-18 ft.; rec. 2 jts. dist.; sqzd. perf.; perf. csg. 8,917-22 ft.; 30-min. D.S.T.; 2,800 lb. W.P.; rec. 4 jts. dist.; sqzd.; perf. csg. 8,750-60 ft.; 26-min. D.S.T. tstd. 2,200 lb W.P.; made sqz. job; drill out cmt. to 11,280 ft.; prep. to perf. csg.; made sqze. job 11,270-11,305 ft.; perf. csg. 11,290-11,305 ft.; flwd. 242 bbl., 12 hrs.; ¼-in. ck.; grv. 31.6°.

Livingston Parish

Roderick Tower, Inc.'s No. 1 James Pirie, Sec. 41-7s-3e. Drlg. sh. 7,350 ft. perf. csg. 9,010-18 ft.; tstg.

Orleans Parish

W. T. Burton's No. 1 L.&N.R.R., Sec. 18 11s-15e. T.D. 10,405 ft.; P.B. 10,150 ft.

W. T. Burton's No. 2 State, Lake Pontchartrain, Twp. 10s-13e. S.D. 10,030 ft.

Plaquemines Parish

California Co.'s No. 1 Delta Minerals, Sec. 2-15s-24e, 13⅜-in. csg. 2,028 ft.; drlg. sh. 9,387 ft.

Gulf Oil Corp.'s No. 1-D Buras Lv. Dist. Sec. 6-23s-3e. 9⅝-in. csg. 8,204 ft.; 7-in. csg. 10,103 ft.; T.D. 10,138 ft.; well flwd. S.W.; abd.

St. Bernard Parish

Gulf Ref. Co.'s No. 4 State-R.R. (Lake Borgne), Twp. 12s-15e. 9⅝-in. csg. 8,161 ft.; T.D. 10,632 ft.; P.B. 9,700 ft.; rmd. to 9,658 ft.; loss core bbl.; P.B. sdtrkd. 8,912 ft.; T.D. 10,528 ft.; 7-in. csg. 10,494 ft.; drlg. sdy. sh. 11,765 ft.

St. Charles Parish

R. H. Parker et al's No. 1 C. L. Thompson, Sec. 87-13s-20e, 10¾-in. csg. 2,599 ft.; T.D. 9,387 ft.

St. James Parish

St. James Oil Co.'s No. 1 Celstine Plant, Sec. 74-11s-4e. R.U.

St. Mary Parish

Joe Domingue's No. 1 Allain, Sec. 46-13s-9e. S.D. 1,510 ft.

Texas Co.'s No. 1 State. Cote Blanche Twp. 16s-7e. Cd. sdy. sh. S.S.O. 7,334-87 ft.; T.D. 8,685 ft.; 9⅝-in. csg. 8,685 ft.; perf. csg. 3,154-64 ft.

Terrebonne Parish

Barnsdall Oil Co.'s No. 1 Nelson, Sec. 2-21s-11e. 10¾-in. csg. 2,767 ft.; 8⅝-in. csg. 10,505 ft.; T.D. 11,288 ft.; sdtrkd.; T.D. 10,917 ft.; P.B. 10,472 ft.

Texas Co.'s No. 4 State, Coon Point, in Lake Calilou, Twp. 23s-14e. Drlg. 7,420 ft.

Vermillion Parish

La. Ld. & Explto. Co.'s No. 1 Walter White hrs., Sec. 17-15s-1e. 13⅜-in. csg. 2,800 ft.; drlg. sh. 4,125 ft.

Texas Co.'s No. 1 Vermillion Par. Sch. Bd., Sec. 16-13s-4e. T.D. 9,923 ft.; 7⅝-in. csg. 9,918 ft.; T.D. 10,595 ft.; P.B. 10,250 ft.; sdtrkd. 10,300 ft.; cd. S.W. sd. 10,659-79 ft.; T.D. 11,762 ft.; clnd. hole; rmg.

G. H. Vaughn's No. 1 Avery Boullion, Sec. 49-13s-4e. Drlg. sh. 6,030 ft.

Humble O. & R. Co.'s No. 39-C West, J. Routh Sur. T.D. 5,916 ft.; W.O.C.

Friendswood—Harris County

Humble O. & R. Co.'s No. 2 Pendarvis, T. Choate Sur. T.D. 6,095 ft.; P.B. to sdtrk.

Fannett—Jefferson County

Gulf Oil Corp.'s No. 3 Bordages, J. Probarth Sur. T.D. 8,254 ft.; 5½-in. csg. 8,253 ft.

Lovells Lake—Jefferson County

Humble O. & R. Co.'s No. 10 Jefferson Ld. Co., C. Hillebrandt Sur. T.D. 7,785 ft.; 5½-in. csg. 7,779 ft.

Humble O. & R. Co.'s No. 1 Oswald, M. Peviot Sur. Drlg. sh. 7,730 ft.

North Cheek—Jefferson County

Strake Pet., Inc.'s No. 1 J. H. Phelan, S. Stivers Sur. Drlg. 8,220 ft.

Strake Pet., Inc.'s No. 1 Pipkin, H.T. &B. Sur. 15. Drlg. sh. 7,321 ft.

South China—Jefferson County

J. K. Hughes Oil Co.'s No. 1-C Guiterman, C. T. Taylor Sur. 12. S.D. 7,900 ft.

Titanic Oil Co.'s No. 2-B Broussard, S. Miles Sur. T.D. 7,879 ft.; 5½-in. csg. 7,879 ft.; perf. csg. 7,870-79 ft.; I.P. 209 B.P.D.; ¼-in. ck.

Titanic Oil Co.'s No. 2-B Guiterman, C. T. Taylor Sur. 12. 10¾-in. csg. 955 ft. T.D. 7,555 ft.; 5½-in. csg. on bttm.; perf. csg. 7,498-7,520 ft.; would not flow; tstg.

Esperson—Liberty County

General Crude Oil Co.'s No. 20 Davis, A. McNeil Sur. T.D. 7,192 ft.; 8⅝-in. csg. 7,181 ft.

General Crude Oil Co.'s No. 11-B Esperson. T.D. 7,398 ft.; 5½-in. csg. 7,025 ft.

Martha—Liberty County

Stanolind O. & G. Co.'s No. 1 Garrow, I.&G.N.R.R. Sur. 7. Drlg. sh. 3,220 ft.

Wilson Creek—Matagorda County

Barnsdall Oil Co.'s No. 1 Stoddard, G. B. M. Cotton Sur. R.U.

Segno—Polk County

Gulf Oil Corp.'s No. 4 Quinn, A. Morales Sur. R.U.

Gulf Oil Corp.'s No. 31 Wing, I.&G.N. Sur. 13. T.D. 8,083 ft.

Gulf Oil Corp.'s No. 32 Wing, I.&G.N. Sur. 14. Drlg. sh.&L. 6,576 ft.

Humble O. & R. Co.'s No. 21-BX Kirby Lbr. Co., H. Jackson Sur. Drlg. sh. 7,593 ft.

Joe's Lake—Tyler County

Republic Prod. Co.'s No. 34 fee, N. Hurd Sur. Drlg. sh. 7,169 ft.

Republic Prod. Co.'s No. 1 fee, A. Sterne Sur. Loc.

Republic Prod. Co.'s No. 35 Wing, I.& G.N. Sur. 15. R.U.

Hilje—Wharton County

Texas Co.'s No. 2 Peters, E.T.R.R. Sur., Sec. 101. Loc.

GULF COAST WILDCATS

Brazoria County

Glenn McCarthy's No. 1 E. W. K. Andrau, H.T.&B. Sur. 5. 10¾-in. csg. 3,512 ft.; T.D. 11,468 ft.; fsg.

Glenn McCarthy's No. 2 Houston Farm Dev. Co., J. Perry & E. Austin Sur. 7. 10¾-in. csg. 3,492 ft.; drlg. sh. 11,420 ft.

Glenn McCarthy's No. 1 W. B. Munson, Samuel Carter Sur. Drlg. sh. 1,983 ft.

Phillips Pet. Co.'s No. 1 McIlvaine, A.C. H.&B. Sur., Sec. 27. Loc

Titanic Oil Co.'s No. 2 S. E. Allen, J. G. and W. McNeil Sur. Loc.

Chambers County

Sun Oil Co.'s No. 1 Clara C. Smith, T.& N.O. Sur. 82. Drlg. 110 ft .

Colorado County

Cockburn Oil Corp. No. 1 R. W. Ferrs, H. Chrisman Sur. Loc.

Shell Oil Co., Inc.'s No. 1 Plow Realty Co., Obediah K. Winn Sur. R.U.

Fayette County

F. J. Hynes et al's No. 1 A. B. Kerr, J. Parrott Sur. Loc.

Fort Bend County

H. C. Cockburn's No. 1 G. W. Burkett, Bundieck Sur. Loc.

Temple Hargrove et al's No. 1 Sugar Ld. Ind., A. Alcorn Sur. S.D. 2,900 ft.

Tide Water Asso. Oil Co.'s No. 1 Geo. Armstrong, Jas. Scott Sur. Loc.

Galveston County

Continental Oil Co.'s No. 1 Stewart Title Guaranty Co., Perry & Austin Sur. T.D. 2,669 ft.; run 10¾-in. csg.

Standard Oil Co.'s No. 1 State, Sec. 234, 10¾-in. csg. 2,001 ft.; T.D. 7,134 ft.; sdtrkd.; T.D. 7,716 ft.; abd.

Standard Oil Co. of Texas' No. 61-54 State. Loc.

Sun Oil Co.'s No. 1 State, Sec. 178, 13⅜-in. csg. 2,032 ft.; S.D. 8,006 ft.

Grimes County

L. J. Sessions et al's No. 1 J. T. Barry. S. Fuelton Sur. Loc.

Harris County

T. A. Carlton Bunte et al's No. 1 Bender, J. W. Singleton Sur. 10¾-in. csg. 1,205 ft.

Gulf Oil Corp.'s No. 1 H. H. Roberts, A. Roberts Sur. T.D. 7,583 ft., S.D.

N. W. Hunter et al's No. 1 Green's Bayou Homesites, S. C. Hiroms Sur. 10¾-in. csg. 810 ft.; drlg. sh. 4,707 ft.

Richard Rodgers et al's No. 1 B. G. Daugherty, W.C.R.R. Sur. Cg. 7,516 ft.

Rowan & Nichols' No. 1 Lobit, B. Barrows Sur. Drlg. sh. 2,367 ft.

Jasper County

Midwest Co.'s No. 1 W. B. Boykin, M. Rack Sur. Loc.

Jefferson County

Hebert & Smith's No. 1 W. S. Clubb, J. L. Lawhorn Sur. Drlg. sh. 3,226 ft.

Merrimac Oil Corp.'s No. 1 State, Tr. 72, 50 ft. due E of Harwell's abd. hole. W.O.; R.U.

Liberty County

Gulf Oil Corp.'s No. 1 Kirby Lbr. Co., Hugh Means Sur. Drlg. sh. 2,736 ft.

Hebert & Smith's No. 1 W. E. Boyt, H. &T.C.R.R. Sur. T.D. 8,834 ft.; cleaned hole to 8,096 ft.; sdtrkd. 7,824 ft.; 7-in. csg. 8,700 ft.; T.D. 8,865 ft.; set screen; flwg. gas and dist.; T.P. 2,125 lb.; C.P. 2,135 lb.

Matagorda County

Deep Rock Oil Corp.'s No. 1 Tom Petrucha, F. W. Dempsey Sur. Loc.

TEXAS

Week Ended March 23

GULF COAST FIELDS

Anchor—Brazoria County

Humble O. & R. Co.'s No. 1 R. H. Carr, Blk. 62. 9⅝-in. csg. 6,950 ft.; T.D. 10,791 ft.; run 7-in. csg.

Humble O. & R. Co.'s No. 1 Crockett, J. de Jesus Valderas Sur. 13⅜-in. csg.; T.D. 10,617 ft.

Humble O. & R. Co.'s No. 1 Galznick & Taylor, J. de Jesus Valderas Sur. 9⅝-in. csg. 6,953 ft.; T.D. 10,994 ft.; 7-in. csg. 10,822 ft.; perf. csg. 10,695-10,700 ft.; swbg.

Humble O. & R. Co.'s No. 1 Heim & Holland. S. Marsh Sur. Loc.

Glenn McCarthy's No. 1 Neidringhaus, J. Bradley Sur. 13⅜-in. csg. 926 ft.; cg. 10,286 ft.

Glenn McCarthy's No. 1 Kate and Laura Yocum, J. D. Valderas Sur. Drlg. sh. 7,520 ft.

Sun Oil Co.'s No. 1 Morris Stern, Shubal Marsh Sur. 18⅝-in. csg. 128 ft.; drlg. sh. 7,030 ft.

Old Ocean—Brazoria County

Harrison & Abercrombie's No. 8 Armstrong, Polly & Chance Sur. Drlg. sh. 10,386 ft.

Harrison & Abercrombie's No. 7 Bernard River Ld. Dev. Co., C. Breen Sur. T.D. 10,525 ft.; tstg.

Stanolind O. & G. Co.'s No. 1 Hughes, C. Breen Sur. Drlg. sh. 6,730 ft.

Sun Oil Co.'s No. 4 Borsodi, C. Breen Sur. 13⅜-in. csg. 1,520 ft.; drlg. sh. 5,420 ft.

Sun Oil Co.'s No. 5 McCampbell, C. Breen Sur. Drk.

Seabreeze—Chambers County

Sun Oil Co.'s No. 1 Felix Jackson, A. Y. Barbo Sur. Drk.

Sun Oil Co.'s No. 1 Samuelson & Whitney, T.&N.O. Sur. 131. Cored sd., oil odor 8,417-18 ft. and 8,422-23 ft.; T.D. 8,469 ft.; 7-in. csg. 8,469 ft.; perf. csg. 8,300-25 ft.; flwg. dry gas.

Big Creek—Fort Bend County

Merrimac Oil Corp.'s No. 1 George, B. Wickson Sur. (SW flank). Spd. and S.D.

Rosenberg—Fort Bend County

Humble O. & R. Co.'s No. 1 R. Kroesche, H.&T.C. Sur. Drk.

Humble O. & R. Co.'s No. 1 Miller, C. N. Simpson Sur. T.D. 8,499 ft.; 7-in. csg. 8,327 ft.; perf. csg. 7,850-73 ft.; rec. gas-cut mud; prep. to abd.

Caplen—Galveston County

Sun Oil Co.'s No. 2-26 State, S. F. Hughes Sur. Loc.

Sun Oil Co.'s No. 3 Zinn-Forman Sur. 13⅜-in. csg. 100 ft.; T.D. 7,850 ft.; run csg.

League City—Galveston County

Phillips Pet. Co.'s No. 7 Lobit, Perry & Austin Sur. Drlg. sdy. sh. 5,636 ft.

Phillips Pet. Co.'s No. 4 Stewart Title Guaranty Co., S. F. Austin Sur. 10¾-in. csg. 3,520 ft.; 7⅝-in. csg. 9,510 ft.; T.D. 11,270 ft.; well blew out; killed; fsg.

Clear Lake—Harris County

Humble O. & R. Co.'s No. 28-C West. Wm. Dobie Sur. T.D. 5,846 ft.; I.P. gas well.

Humble O. & R. Co.'s No. 38-C West, G. B. McKinstry Sur. Drlg. L. 4,036 ft.

LEGAL

Department of the Interior, United States Land Office, Las Cruces, New Mexico. Notice is hereby given that a lease of the oil and gas deposits in the NE¼ SW¼, SW¼ SW¼, NW¼ SE¼, and E½ SE¼ Sec. 35, T. 17 S., R. 27 E., N.M. P.M., New Mexico, containing 200 acres, in the Empire Oil and Gas Field, is offered to the responsible qualified bidder of the highest bonus per acre pursuant to the provisions of Section 17 of the leasing act of February 25, 1920 (41 Stat. 437), as amended, at the royalty rate scale in the lease form shown in General Land Office Circular 1386, at a sale to be held in the office of the Register of the District Land Office at Las Cruces, New Mexico, at 10 o'clock A. M. on April 3, 1940. The successful bidder must deposit on the date of sale a certified check on a solvent bank, or cash, for 1/5 of the amount of the bid, and file a showing of qualifications to receive the lease required by section 7 of Circular 1386. The remaining 4/5, together with the annual rental in advance at the rate of $1 per acre, must be paid and a $5,000 corporate surety bond must be furnished prior to the issuance of the lease. The bidders are warned against violation of the provisions of section 59 of the United States Criminal Code approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids at the discretion of the Secretary of the Interior. Register, Paul A. Roach, Register.

For QUICK, ACCURATE TESTS
Use CURTIN CENTRIFUGES
No. 3420... 15 c.c. machine. Cranks and heads interchangeable with 100 c.c. machines.

Simple in design . . . Ruggedly built . . . Require no special care . . . Gear Ratio and throw of crank produce required speed with no strain. Curtin Centrifuges meet all *A.S.T.M. Standard Method D-96-35* and *A.P.I. Code No. 25* requirements. Fully descriptive literature upon request.

W·H·CURTIN & CO. Inc.
HOUSTON U.S.A. TEXAS

New MAC
PLUNGER BARREL
for 2-inch tubing

Outlasts three ordinary barrels, as Steel Plunger works in and out of Cast Iron Barrel as much as 2 feet on the up and down stroke and more if desired, thus flushing itself free of sand or gypsum.

Reversible Valve Body and Plunger make for lowest upkeep.

Furnished with 2-Cup Standing Valve and with, or without, Garbutt Rod.

Save, with the New "MAC"!

Ask for complete details and price list.

McGREGOR
WORKING BARREL COMPANY
Bradford, Pa., U.S.A.

Stanolind O. & G. Co.'s No. 1 General American Life Ins., J. C. Peyton Sur. Drlg. sh.&L. 6,360 ft.
Texas Gulf Prod. Co.'s No. 1 Gulf Tex. Oil Co., Ira Ingram Sur. Drk.
Texas Co.'s No. 1 Taylor, Freeman George Sur. Drlg. sh. 3,110 ft.
Van M. Vincent's No. 1 J. F. McNabb Est., E. R. Wightman Lge. Loc.

Montgomery County

H. C. Cockburn et al's No. 1 Bender, Montgomery Co. Sch. Ld. and De Crow Sur. Loc.
Continental Oil Co.'s No. 1 Bender est., Montgomery Co. Sch. Ld. Sur. 13⅜-in. csg. 1,243 ft.; T.D. 8,886 ft.; fsg.
David B. MacDaniel's No. 1 Hattie O. Baldwin, Walker Co. Sch. Ld. Sur. 10¾-in. csg. 1,230 ft.; cg. for sd. below 9,000 ft.
West Conroe Oil Corp.'s No. 1 R. L. Caifee, H. N. McDillon Sur. S.D. 5,017 ft.; tstd. S.W. 4,516-78 ft.

San Jacinto County

Shell Oil Co., Inc.'s No. 1 Santa Fe Tie & Lbr. Co., J. Rankin Sur. Loc.

Tyler County

J. C. Bonham's No. 1 Southwestern Lbr. Co., F. Smyth Sur. T.D. 1,340 ft.; P.B. 1,126 ft.; W.O. csg.
J. Z. Werby's No. 1 Hayes, J. C. Boyett Sur. T.D. 5,526 ft.

Washington County

J. A. Deering's No. 1 C. W. Bohne, S. Gates Sur. Drlg. sh. 5,442 ft.
Mount Selman Oil Co.'s No. 1 Fritz Fuelberg, W. Lightfoot Sur. Cg. sh. 5,717 ft.

Wharton County

Cockburn Oil Corp.'s No. 1 Leverage, Jonathan Scott Sur. Drlg. sh. 5,510 ft.
O. C. Garvey's No. 1 T. N. Menefee, S. P. Middleton Sur. Drlg. sh. 1,527 ft.
Mackhank Oil Co.'s No. 1 F. W. Wilson, E.T.R.R. Sur. 101. T.D. 5,232 ft.; flwg. oil and wash wtr.; ½-in. ck.
Magnolia Pet. Co.'s No. 1 C. Swanson, E.T.R.R. Sur. 39. 10¾-in. csg. 248 ft.; T.D. 6,598 ft.; abd.
Dr. T. M. Neal's No. 1 fee, Elisha Flack, 4,840 ft.
Strake Pet. Corp.'s No. 1 Poole, Sec. 25, G.H.&H. Sur. T.D. 10,110 ft.; 5½-in. csg. on bttm.; P.B. 9,973 ft.; perf. csg. 9,938-55 ft.; flwd. 3 B.F.P.H., 30% oil, 70% wash wtr.; started to flow 100% S.W.; killed; reperf. csg.

S. W. TEXAS WILDCATS

Aransas County

Continental Oil Co.'s No. 1 St. Charles Co., R. D. Blassman Sur. 18⅝-in. csg. 290 ft.; T.D. 9,335 ft.; well blew out; caught fire; fire out; well still blowing; hole bridged.
Continental Oil Co.'s No. 2 St. Charles Co., R. D. Blassman Sur.; (relief well to blow out). Spd. and S.D.

Atascosa County

John Durst's No. 1 Wright, Edw. Morris Sur. S.D. 475 ft.
Red Bank Oil Co. et al's No. 1 J. P. Pratt Francisco de la Garza Sur. 46; 7-in. csg. 2,347 ft.; set 5½-in. lnr. 3,074 ft.; T.D. 3,072 ft.; swbg.

Bastrop County

C. R. Franklin's No. 1 Oscar McDonald, Martha Baker Sur. T.D. 1,853 ft.; fsg.

Bee County

Bunte Bros., Inc.'s No. 1 J. T. Earnest, Bee Co. Sch. Ld. Sur. 7-in. csg. 5,973 ft.; drlg. sh. 9,780 ft.
Mills Bennett Prod. Co. and Anderson-Prichard Oil Co.'s No. 2 Robinson, J. M. Uranga Sur. (Wlx. test, West Tuleta field). 13⅜-in. csg. 2,537 ft.; 9⅝-in. csg. 7,804 ft.; T.D. 9,210 ft.; D.S.T. 9,110-9,210 ft.; rec. 4 jts. mud; P.B. 7,900 ft.
Sultex Oil Co.'s No. 1 Wood, Jas. McGeehan Sur. Drlg. sh. 4,447 ft.
Union Prod. Co.'s No. 56 Ray T. Hanson Sur.; (Pettus field). Wlx. test; 10¾-in. csg. 4,856 ft.; drlg. sh. 8,069 ft.

Bell County

J. J. Cormas' No. 1 Jeff Ellis, Elizabeth Berry Sur. Drlg. L. 410 ft.

Bexar County

Joe Noake's No. 1 San Antonio Sub. Irrg. Farm, W. Miller Sur. 180. S.D. 473 ft.
Philtop O. & G. Co.'s No. 2-A Patton, Fernando Rodriguez Sur. T.D. 1,938 ft.; S.D.
J. A. Tarver's No. 1 Florence Lam, Manuel de Luna Sur. 3. 6⅝-in. csg. 1,205 ft.; T.D. 1,692 ft.; cd. bkn. sh. 1,638-92 ft.; S.S.O.; balled est. 10 bbl. oil P.D. before sanding up; S.D.
J. A. Tarver et al's No. 1 Joseph Leonard, Manuel de Luna Sur. 3. Drlg. 1,360 ft.

Blanco County

E. L. Nixon's No. 3 Crist, John McClenechen Sur. 94. T.D. 1,330 ft.; abd.

Burleson County

H. Y. Barnett's No. 1 Glesenschiag, J. W. Hollingsworth Sur. T.D. 1,818 ft.; rec. S.W.; D.S.T.; drlg. sh. 1,928 ft.

Caldwell County

J. E. Dickson's No. 1 Jeff Connolly, J. D. Rains Sur. R.U.
Kean & Williamson's No. 1 E. E. Rector, J. Roberts Sur. Drlg. sh. 520 ft.

Calhoun County

Coronado Corp.'s No. 1 K. Welder, Hidalgo Sur., 3 mi. SE Seadrift, "Tight well"; reported to be tstg.; 5½-in. csg. 9,750 ft.; perf. csg. 9,500-9,600-9,700 ft.; rec. S.W.; made sqze. job at 8,580 ft.; prep. to perf. csg.
Eura B. Oil Co.'s No. 1 T. P. Traylor, Sec. 3, I.&G.N. Sur. Loc.
Ray-Ranger et al's No. 1 W. W. Wilson, V. Garcia Sur. Drlg. sh. 5,976 ft.

Cameron County

Sal Vieja Oil Co. et al's No. 1 Garcia, Santa Isabel gr. Drlg. 7,380 ft.

De Witt County

Atlantic Ref. Co.'s No. 1 Pearl Conwell, Chas. Lockhart Sur. T.D. 8,518 ft.; 5½-in. csg. 8,286 ft.; perf. csg. to test.

Dimmit County

Alamo Drlg. Co.'s No. 1 McKnight, I.& G.N. Sur., Blk. 13, Sec. 25, Lot 14. T.D. 917 ft.; abd.

Duval County

C. Andrade's No. 1 Miller, J. M. Ynojosa gr., Sec. 62. 10¾-in. csg. 624 ft. drlg. sh. 1,510 ft.
Bridwell Oil Co.'s No. 1 E. A. Parr, T. C. Rogers Sur. R.U.
W. L. Catlin et al's No. 1 Louis Escapule, J. Poitevent Sur. 73. R.U.
Landreth Prod. Co.'s No. 1-A C. M. Robinson, Paul Henry Sur. 116. Drlg. sdy. sh. 4,972 ft.
Magnolia Pet. Co.'s No. 1 Well Sur. 561. T.D. 2,857 ft.; W.O.C.
Mayfair Oil Corp.'s No. 1 Yates, S.A.&M. G.R.R. Sur. Loc.
P. R. Rutherford's No. 1 Clara Driscoll, U. Lott Sur. 243. Cg. 2,700 ft.
Standard Oil Co. of Texas' No. 1 Rodriguez, San Pedro de Charco Redondo gr. 7-in. csg. 5,691 ft.; T.D. 6,838 ft.; I.P. 16 bbl. dist. per day; ¼-in. ck.
Sun Oil Co.'s No. 1 Garcia, A.B.&M. Sur., Sec. 407. Loc.

Falls County

J. Shaunfield's No. 1 Barganier, J. M. Graham Sur. Bda. L.; S.S.O.; T.D. 1,188 ft.; recmtd. csg.; W.O.; cmt. failed to hold.

Gonzales County

M. T. Huebner's No. 1 M. P. Smith, R. Plummer Sur. T.D. 1,135 ft.

Guadalupe County

Diamond Half Oil Corp.'s No. 1 W. J. Strey, Josefan de los Cortinos Sur. 49. 5½-in. csg. 753 ft.; T.D. 797 ft.; 40 ft. O.I.H.; will R.U. to pmp.
D. Eickenroht et al's No. 1 Wm. Ocikera, Antonio Maria Esnaurrizar Sur. T.D. 1,022 ft.; abd.
F. W. Nute's No. 1 M. T. Howell, Jacob Darst Sur. T.D. 2,894 ft.; abd.
F. D. Spratt's No. 1 Wm. Zuchl, Claiborne Rector Sur. 38. Drlg. sh. 832 ft.

Hidalgo County

Gulf State Oil Co.'s No. 2 Cardinas, San Salvador del Tule gr. 16-in. csg. 157 ft. T.D. 8,700 ft.; fsg.
Homer P. Lee's No. 1-A Yturria Town & Imp. Co., Anastacio Villareal gr. Drlg. 3,215 ft.
Humble O. & R. Co.'s No. 1 T. A. Ogg, Rio Bravo subd. S.D. 8,695 ft.

Jim Hogg County

Humble O. & R. Co.'s No. 4 C. T. Mestena O. & G. Co., San Antonio de Balcurate gr. R.U.
Sun Oil o.'s No. 2 East, A.B.&M. Sur. 39. Drlg. sh. 4,433 ft.

Jim Wells County

H. H. Howell's No. 1 G. H. Bierstedt, I. &G.N.R.R. Sur. 501. T.D. 5,634 ft.; abd.
M. M. Miller's No. 1 fee, Casa Blanca gr. M.I.M.
Frank Gravis, Inc.'s No. 1 Forry, Lavaca gr. Spd.
Texas Gulf Prod. Co.'s No. 1 Gallagher, Blk. 16, J. H. Gallagher subd. 10¾-in. csg. 608 ft.; cg. 5,780 ft.

Karnes County

Clyde Eckols' No. 1 J. M. Newberry, Carlos Martinez Sur. 5½-in. csg. 3,002 ft.; T.D. 3,008 ft.; perf. csg. 2,942-49 ft.; swbg.
R. W. Ford and Crown Central Pet. Corp.'s No. 1 Ed Jendrusch, Erasmo Seguin Sur. Drlg. sh. 1,467 ft.

Kendall County

C. M. Dewey's No. 2 Seidensticker, R. Davis Sur. 20. Drlg. 1,060 ft.

Kimble County

Austin Bridge Co.'s No. 1 Wilkinson, Brooks & Burleson Sur. S.D. 195 ft.
J. C. Renfro's No. 1 D. C. Morales, Hrs. of H. Grote, Sur. 423. S.D. 20 ft.
Schwab-Cariyle & Auld's No. 1 Baker, F. C. Stisser Sur. 417. Drlg. 65 ft.

Kinney County

Cooper Gas Co.'s No. 1 L. L. Farr, Geo. L. Bledsoe Sur. 835 ft. T.D. 1,943 ft.; 8-in. csg. 1,929 ft.; T. Edw. L. 1,890 ft.

Kleberg County

Humble O. & R. Co.'s No. 1 O. J. Mork, Rincon de Santa Gertrudis gr. Drlg. sh. 7,309 ft.
Skelly Oil Co.'s No. 1 State, Laguna de Los Olmos gr., Tr. 385. Drlg. sh. 4,676 ft.

Lee County

Fred Pederson et al's No. 1 Brown, David Hudson Sur. T. Glen Rose L. 6,600 ft.; drlg. sdy. L. 7,810 ft.

Live Oak County

H. F. Baker's No. 1 Saunders, Christ Scanlon Sur. 67. S.D. 341 ft.
Hagan & Stewart Drlg. Co.'s No. 2 Reagan, M. Hely Sur. 5. T.D. 784 ft.; 5½-in. csg. 776 ft.; bailing; showing small amt. of oil.
E. M. Jones' No. 1 West, Lot 400, Blk. of West subd. S.D. 8,548 ft.
Pocono Dev. Co.'s No. 1 San Antonio Joint Stock Ld. Bnk., Richard Everett Sur. 1. R.U.
W. R. Quinn, et al's No. 1 Stolze, J. F. Huizar Sur. 31. S.D. 25 ft.
L. W. Stieren's No. 3 Lange, Thos. Adams Sur. T.D. 1,497 ft.

McMullen County

F. H. Gohlke's No. 3 Miles, Wm. Kohfler Sur. 78. T.D. 1,078 ft.; abd.
C. D. Scarborough's No. 1 First Natl. Bk. of Rosebud, Jas. Garner Sur. S.D. 1,955 ft.
Tybro Oil Co.'s No. 1 Martin, H. L. Williams Sur. 18. T.D. 1,219 ft.; abd.

Medina County

T. J. Tapp's No. 1 Bendele, F. Sauer Sur. 117. S.D. 205 ft.

Milam County

Fritz Fuchs' No. 1 Unaseh, Jose Justo Liendo Sur. T. clk. 1,100 ft.; T.D. 1,895 ft., L.; may run csg. to test.

Nueces County

Houser-Warren & Ginther's No. 1 Lynn Davis, Palo Alto gr. Drlg. sh. 6,760 ft.
Humble O. & R. Co.'s No. 1 D. F. Duncan, Blk. 50, Lot 2. Spd.
John Manley et al's No. 1 Ruegg, Geo. H. Pauls subd. of Driscoll ranch. Loc.
Richardson Pet. Co.'s No. 1 Studer, M. L. De Herrera gr. R.U.
Wellington Oil Co. and Seaboard Oil Co.'s No. 1 Swenson, Santa Petronilla Sur. Rec. small amt. of oil and mud on D.S.T. 5,311-23 ft.

Refugio County

Norsworthy Prod. Co.'s No. 1 Wood, John Sinnott Sur. T.D. 6,508 ft. (cor.). T.A.
H. J. Porter's No. 1 R. H. Morrow, E. Perry Sur. Drlg. 3,046 ft.

San Patricio County

Texas Gulf Prod. Co.'s No. 1 San Antonio Loan & Tr. Co., M. McAuley Sur. Drlg. sh. 5,900 ft.
Tide Water Asso. Oil Co. and Sinclair Prairie Oil Co.'s No. 1 Ragsdale, S. S. Gillett Sur. Spd.
Fred Wood et al's No. 1 C. E. Hart, Wm. G. Burgess Sur. 5½-in. csg. 7,250 ft.; tstd. S.W. 6,910-13 ft.; perf. csg. 6,900-11 ft.; swbd. S.W.; S.O.; heading small amt. of oil.

Starr County

Hebert Aid's No. 1 Guerra, J. J. Gutierrez Porc. 72. Drlg. 623 ft.
Lynes & Robertson's No. 1 Villareal, C. C.S.D.&G.N.R.R. Sur. 241. Loc.
Sun Oil Co.'s No. 1 W. G. Lehr, C.C.S.D. R.G.N.G.R.R. Sur. Drlg. 3,536 ft.
Sun Oil Co.'s No. 1 Rodriguez, Santa Teresa gr. Drlg. sh. 6,850 ft.
Syndicate Oil Corp.'s No. 1 Sanchez, Santos Sanchez Sur. 344. T.D. 1,004 ft.

Travis County

O. L. Patton's No. 1 I. P. Jones, Rueben Hornsby Sur. 17. T.D. 550 ft.; abd.
J. C. Tittle's No. 1 C. A. McEachern, O. Buckman Sur. 40. T.D. 820 ft.; abd.
L. M. White et al's No. 1 P. C. Wells, J. Harper Sur. 42. Run 7-in. csg.; drlg. L. 1,450 ft.

Val Verde County

Joiner Oil Co. et al's No. 1 Clyde Sellers. S.D. 1,822 ft.

Victoria County

John Mayo et al's No. 1 Hubalak, V. Garcia Sur. R.U.

Webb County

O W. Kilam's No. 64 Bruni, M. H. Rodriguez Sur. 446. T.D. 1,879 ft.; 5½-in. csg. 1,830 ft.; perf. csg. 1,802-06 ft.; flwg. 5 B.O. and 35 B.S.W. per day; ⅝ in. ck.
V. G. Schimmel's No. 1 Volpe, Mary H. Pennell Sur. 698. Drlg. sh. 3,450 ft.
Sinclair Prairie Oil Co.'s No. 1 Callaghan Ld. & Cattle Co., B.S.&F. Sur. 585. 13⅜-in. csg. 1,508 ft.; drlg. sh. 5,910 ft.
Tide Water Asso. Oil Co.'s No. 7 Bruni, Blk. 7, M. Arispe gr. (deep test Bruni field). T.D. 8,959 ft.; well blew out; hole bridged; stk. D.S.; prep. to P.B. and test approx. 5,600 ft.; perf. D.P. 5,636-45 ft. and 5,621-31 ft.; tstd. dry; sqzd. off; perf. csg. 5,620-30 ft.; tstd. 4 B.O.P.D.; 2,000,000 cu. ft. gas; ¼-in. ck.; T.P. 150 lb.; 350 lb. on D.S.; I.P. 6 B.O., 6 bbl. b.s.&w per day. ¼-in. ck.

Williamson County

C. C. Lanier's No. 1 Guental, Harry Cooke Sur. R.U.
H. C. Lefors' No. 1 H. J. Prismeyer, Jehu Bevil Sur. 56. S.D. 1,936 ft., L.
Taylor Ref. Co.'s No. 2 Hurta, P. Coursey Sur. T.D. 1,399 ft., L.; 7-in. csg. 1,380 ft.; tstg. showing a small amt. of wtr.

Wilson County

Henshaw Bros.' No. 1 E. W. Schneider, Don Casper Flores Sur. 10-in. csg. 99 ft.; drlg. sh. 2,925 ft.
W. D. Moore et al's No. 1 Lorenz, Morris May Sur. S.D. 75 ft.
E. E. Young's No. 1 O. D. McMeans, C. W. Parrott Sur. R.U.

Zapata County

J. P. Martin et al's No. 1 Serapio Vela, El Grullo gr. T.D. 3,108 ft.; sdtrkd.; T.D. 3,505 ft.; 5½-in. csg. 2,906 ft.; P. B. 3,105 ft.; tstg.

Zavala County

H. F. Wilcox O. & G. Co.'s No. 2 Storey G.W.T.&P.R.R. Sur. Drlg. sh. 2,110 ft.

WEST TEXAS WILDCATS

Andrews County

Illinois Oil Co.'s No. 1 University, Sec. 14, Blk. 12, Univ. Sur. Prep. spud.
Richmond Drlg. Co. and T. F. Hunter's No. 1 University, 660 ft. N and E lines of Sec. 21, Blk. 11, University Sur. Drlg. plug 5,172 ft.

Concho County

Charter O. & G. Co.'s No. 1 T. Y. Hill, SW part of Julius Frederick Sur. 1693, Abst. 198. Drlg. 1,000 ft.
Floyd Dodson's No. 1 Wilson, Thomas Green Sur. 1; 3,500-ft. test. Prep. U. R. 10-in. csg. from 2,197 to 2,400 ft., T.D.

Crane County

Gulf Oil Corp.'s No. 5 M. B. McKnight, Sec. 1, Blk. 34-B, P.S.L. Sur. Drlg. 6,266 ft.
Gulf Oil Corp.'s No. 1-K University, 330 ft. N and E lines, Sec. 2, Blk. 31, University Sur. Drlg. 1,915 ft.
Gulf Oil Corp.'s No. 12 Waddell, Sec. 30, Blk. 26-B, P.S.L. Sur. 12-in. 532 ft. S.O. 3,215-20 ft.; S.S.G. 3,635 ft.; 8-in. csg. cmtd. at 3,713 ft.; S.D.R. 3,763 ft.

Crockett County

Continental Oil Co.'s No. 2 Todd, 1,980 ft. S and W lines of Sec. 29, Blk. W. X, G.C.&S.F. Sur. Skd. rig W; T. Crinoidal L. 5,600 ft.; T.D. 5,690 ft.; S.O.; prep. test.
Soma O. & G. Synd.'s No. 1 W. T. Noelke, NW part Sec. 30, Blk. GG, H. E.&W.T. Sur. Drlg. 250 ft.
Spearis Interests' No. 1 A. C. Hoover, Sec. 10, Blk. 1, G.C.&S.F. Sur.; 2,500-ft. test. Loc.

Ector County

Ralph R. Gill's No. 1 Parker, SE¼ Sec. 12, Blk. 45, T-2-S, T.&P. Sur.; deep Holt horizon test. Drlg. 4,903 ft.
M. A. Grisham et al's No. 1 R. B. Cowden, 600 ft. from N and E lines, Sec. 4, Blk. 45, Twp. 1n (deep test), T.&P. R.R. Sur. Rmg. 5,555 ft.
Landreth Prod. Corp.'s No. 1 T.X.L., NW cor. Sec. 3, Blk. 43, T-1-S, T.&P. Sur.; deep Holt-horizon test. Prepg. to dpn. from regular pay zone to deep level; sat. and por. 5,153-96 ft.; swbg. and tstg. 66 B.F. in 12 hrs., 6 per cent wtr. R.U. pmp.; 99 B.O. in 24 hrs.; T.D. 5,196 ft.
Richmond Drlg. Co. and Rhodes & Tompkins' No. 1 J. L. Johnson, NW cor. Sec. 25, Blk. 43, T-1-S, T.&P. Sur.; deep Holt horizon test. T. solid L. at 3,940 ft.; S.I. 4,141 ft.; prep. to comp well from regular pay level.
Western & Southern Oil Co.'s No. 1 Smith, NW cor. Sec. 6, Blk. 42, T-1-S, T.&P. Sur.; deep Holt-horizon test. Drlg. 4,335 ft.

Gaines County

Stanolind O. & G. Co.'s No. 1 T. S. Riley, Sec. 11, Blk. H.D.&W. Sur. Shot 4,762-4,864 ft.; C.O.; bailed 1 bbl. hourly before shot; T.D. 4,864 ft.; swbd. 10 B.O. in 8 hrs.; bailed dry and bailed 10 B.W. in 9 hrs.; pmpd. 30 B.O. and 30 B.W. in 24 hrs.; tstg.

Hockley County

Denver Prod. & Ref. Co. and Helmerich & Payne, Inc.'s No. 1 Whiteface Farms, 660 ft. from S and E lines Labor 22, Lgt. 77, Reeves C.S.L. Sur. Had 72 ft. of sat.; drld. plug and found no shows; T.D. 4,796 ft.; tstd. sul. wtr.; prep. P.B. and test.

Hudspeth County

Haymon Krupp Oil & Ld. Co.'s No. 1 Briggs, Sec. 24, Blk. 73, Twp. 7, T.& P. Sur. Drlg. 6,088 ft.

Loving County

J. E. Whitesides' No. 1 fee, Sec. 24, Blk. 76. Prep. run 10-in. 1,132 ft.; S.S.O.; drlg. 4,160 ft.

Lynn County

Guthrie Lake Oil Co.'s No. 1 Mary L. Shoe, Sec. 20, Blk. S, E.L.R.R. Sur.; 800-ft. test. S.D.R. 626 ft.

Mitchell County

Ewing & Hanes' No. 1 G. I. Grable, Sec. 195, Blk. 3, H.&G.N. Sur.; 1,800-ft. test. Drlg. 927 ft.
N. V. Hilburn's No. 1 E. T. Strain, Sec. 82, Blk. 97, H.&T.C. Sur. S.D.R. 1,100 ft.

Pecos County

Humble O. & R. Co.'s No. 1 Young, Sec. 33, Blk. 10, H.&G.N. Sur. Top detrital 5,185 ft.; T. Simpson 5,624 ft. after logging 504 ft. of detrital; drlg. 5,900 ft.
B. McCandless and General Crude Oil Co.'s No. 1 Virginia W. Crockett, Sec. 5, Blk. 110, T.C.R.R. Sur. T. Ellenburger 4,401 ft.; tstg. est. 6,000,000 cu. ft. gas after acd.; rng. tbg.; T.D. 4,479 ft. est. 4,000,000 cu. ft. gas and 365 B.O. P.D.; made 531 B.O. in 5 hrs.; S.I.
Skelly Oil Co.'s No. 1 J. S. Masterson (Ordovician test), Sec. 101, Blk. 10, H. &G.N. Sur. Topped Ellenburger 44 ft.

high; flwd. 32 B.O.P.H.; made 518 B. O. in 10 hrs.; S.I. 5,614 ft.
R. L. Walker's No. 1 White & Baker, Sec. 86, Blk. 194, G.C.&S.F. Sur. Drlg. 1,480 ft.

Stonewall County

Shell Oil Co., Inc.'s No. 1 Smith, Sec. 143, Blk. 1, H.&T.C. Sur. Rerng. 5½-in. csg. 5,558 ft.
W. I. Southern's No. 2 Carlisle, Sec. 293, Blk. D, H.&T.C. Sur. T. Ellenburger 5,540 ft.; S.S.O. 6,543 ft.; drlg. 6,670 ft.

Terrell County

E. M. Thomasson's No. 2 Bates, Sec. 30, Blk. 1, I.&G.N. Sur. Drlg. 415 ft.

Terry County

Geo. P. Livermore's No. 1 M. E. Jacoboson, Sec. 6, Blk. 11-D, C.&M. Sur. R.U.R.
Tide Water Asso. Oil Co.'s No. 1 Lowe, SW part Sec. 3, Blk. 37-C, P.S.L. Sur. W.O.C. 305 ft.

Tom Green County

B. C. Mann's No. 1 Joe Funk, 330 ft. N. 1,650 ft. E. lines, Sec. 34, Blk. 5, H.& T.C. Sur. S.D. for 12-in. csg. at 1,225 ft.

Ward County

Gulf Oil Corp.'s No. 5 Wristen, Sec. 13, Blk. 5, H.&T.C. Sur.; scheduled Ordovician test. Drlg. 5,746 ft.
Kenneth Slack's No. 1 Bird Hayes, Sec. 148, Blk. 34, H.&T.C. Sur. Drlg. 4,916 ft.

TEXAS PANHANDLE

Potter County

Canadian River Gas Co.'s No. 1 City of Amarillo, in city limits just north of city. Drlg. 4,135 ft.

Sherman County

I.T.I.O. Co.'s No. 1 S. C. Bryant, C NW¼ Sec. 369, Blk. T-1, T.&N.O. Sur. W.O.C. 2,357 ft.; drlg. 2,630 ft.

E. C. TEXAS WILDCATS

Anderson County

R. H. Williamson's No. 1 O. G. Rogers, Wm. Greenwood Sur., 6 mi. SW of Elkhart. Had gas blowout 4,380-90 ft.; under control; est. 30,000,000 cu. ft. gas; blwg. gas at 5,407 ft.

Angelina County

Ginter Bros.' No. 7 Copes hrs., J. Morin Sur., 3 mi. E of Dibol. S.D. 2,284 ft.

Falls County

M. Hays' No. 1 A. N. Taylor, F. Mahan Sur., 1 mi. NE of Lott. Loc.

Freestone County

C. F. W. Young's No. 1 Ray Simmons, M. DeCantona Sur., 1½ mi. W of Simmsboro. R.U.

Gregg County

Roger Lacy's No. 1 Lacy, S. P. Ford Sur., 3 mi. SW of Longview; deep Trinity gas test. Drlg. 1,530 ft.

Henderson County

Dilworth Hager's No. 2 Coleman & Faulk, R. S. Rayburn Sur., 3½ mi. NW of LaRue, W.O.C. 60 ft.

Hopkins County

W. P. Vaughn's No. 1 Employers Reliance, F. Hopkins Sur., 3 mi. N of Tira. S.D.R. 1,323 ft.

Houston County

J. C. Wynne et al's (Shell Oil Co., Inc.) No. 1 G. E. Dorsey, M. Sallas Sur., 2½ mi. S of Percilla; E 102 ac. of tr.; 10,000-ft. test. D.S.T. 8,541-76 ft.; rec mud cut with gas and oil; taking side wall cores below 10,000 ft.; contract depth of 10,900 ft. completed; no shows of oil below Glen Rose; perf. csg. 10,794-10,822 ft. with 112 shots; P.B. and tstg.

Kaufman County

Groginske & Cannon's No. 1 Eli H. Brown, M. Reynolds Sur., 5½ mi. SW of Kaufman. R.U.
W. H. McGee's No. 1 Rutland Saving Bnk., John Baker Sur., 2¼ mi. NE of Tulosa. Cg. 3,665 ft.

Limestone County

Peyton Bros.' No. 1 Harris, P. Varell Sur. Drlg. 5,283 ft.

Navarro County

C. F. Carter's No. 1 Allen Eden, M Shire Sur., 2 mi. NE of Angus. Bailing mud with S.O. 1,201 ft.
M. M. Johnson's No. 1 Flemming, J. Smith Sur., 5 mi. SE of Corsicana. Loc.

Rusk County

A. O. Whittington's No. 1 Kangerga Bros., Ign. Castro Sur., 9½ mi. N and slightly E of Pirtle. S.D. 80 ft.; prep. D.D.

Smith County

Sun Oil Co.'s No. 1 E. B. Huddle, Wm Dickerson Sur., 2 mi. S of Noonan dist. producer in Chapel Hill area third D.S.T. failed; may test again or may P.B. to Glen Rose L.; sat. drld. from 7,983-8,019 ft.; T. Pett. 7,930 ft.; T. Tr. Pk. 8,090 ft.; tstg.; T.D. 8,226 ft.; est. 5 B.O. with wash wtr.

Van Zandt County

E. L. Shackelford's No. 1 E. J. Combs, J. Wright Sur., 3½ mi. NW of Grand Saline. Loc.

EAST TEXAS

(Border Counties)

Marion County—Other

L. Lindsey's No. 1 Griffith hrs., G. Coore Sur. Drlg. 670 ft.
L. Lindsey's No. 2 Hart, G. Coore Sur. Drlg. 2,296 ft.
H. T. Manning's No. 1 T. O. Livingston, G. Coore Sur. R.U.

Shelby County

Earl McDaniels et al's No. 1 J. S. Swann, 250 ft. NE cor. 100-ac. tr., Ann Gray Sur. M.I.M.

WEST CENTRAL TEXAS DISTRICT

Brown County

A. M. Stalcup's No. 1 J. C. Morris, 80 ft. S, 700 ft. E lines of Morris tr. b John Goodwin and W. B. Hester Surveys. S.D. csg. 972 ft.
M. R. Staurd's No. 1 E. Hennigan, NW M.E.P.&P. Sur.; 1,000-ft. test. Fsg. tools 405 ft.

Callahan County

D Fox and E. L. Dunn's No. 1 A. and G. Berry, NE pt. Sec. 78, B.B.B.&C. Sur., 950-ft. test. Fsg. tools 865 ft.
W. Lee's No. 1 H. W. Ross, 2,420 ft. W. 1,540 ft. S lines, Sec. 98, B.B.B.&C. Sur. Drlg. 355 ft.

Coleman County

Anzac Oil Corp.'s No. 1 McCord, 2,200 ft. E, 2,196 ft. S of B.B.B.&C. Sur. Drlg. 200 ft.
Robertson & Bradford's No. 1 Morris 330 ft. N, 1,582 ft. W lines, Blk 2 G.H.&H. Sur. Drlg. 1,330 ft.

Comanche County

K. R. March's No. 1 P. Scott, SE cor. NE SW Sec. 25, Blk. 2, H.&T.C. Sur.; 1,200-ft. test. Drlg. 806 ft.

Coryell County

Kistler O. & G. Co.'s No. Barnes, 360 ft. SE line, 3,700 ft. NE line of H. Farley Sur., 3 mi. NE of Gatesville; 2,500-ft. test. Rng. 6-in. csg. 600 ft.

Eastland County

Dobbs Oil Corp.'s No. 1 Mrs. R. L. Poe, 1,320 ft. from S and E lines of SW¼ Sec. 37, Blk. 3, H.&T.C. Sur. Drlg. 575 ft.
Dobbs Oil Corp.'s No. 1 Thomasson, S. H. Key Sur., 330 ft. from N, 846 ft. from E lines of 80-ac. tr. Drlg. 490 ft.
Hickok Prod. & Dev. Co.'s No. 1 Wright & Harrell, 2,485 ft. from east, 2,845 ft. from S lines of J. B. Hozie Sur., 4 mi. NE of Cisco. Rmg. 15-in. csg. 859 ft.

Erath County

T. G. Jackson's No. 1 J. W. Taylor, Prater Sur., Abst. 1029, 4 mi. NE of Desdemona. S.D. 3,395 ft.; prep. to test; est. 15 to 20 B.O.P.D. at 3,360-75 ft.

Hamilton County

A. J. Caldwell's No. 1 W. W. Jones, 1,002 ft. from NE, 330 ft. from SE lines of W. H. Crowder Sur. Rng. 8-in. csg. at 1,300 ft.
Wallace & Wallace's No. 2 C. E. Lund, C S½ E 20 ac., N½ SW¼, R. J. Bailey Sur. 51. Csg. 300 ft.; S.D.R. 2,460 ft.

Jones County

C. W. Bryon's No. 1 L. B. Gray, NW cor. S½ NW¼ Sec. 25, D.&D.A. Sur.; Palo Pinto L. test. S.D.O. 3,340 ft.
J. E. Farrell's No. 1 F. B. Reid, NW¼ Sec. 31, D.&D. Sur.; 3,500-ft. test. Drlg. 2,124 ft.
Iron Mountain Oil Co.'s No. 1 I. F. Wiley, 330 ft. from S and E lines SW¼ Sec. 14, Deaf & Dumb Ld. Drlg. 635 ft.
Merry Bros. & Perini's No. 1 S. L. Hodges, SW¼ S½ A. Bell Sur. 6; 2,150-ft. test. Rng. 8-in. csg. 1,489 ft.
W. I. Southern's No. 1 A. A. Hayden, G. Martinez Sur., S of Anson on west side of Prichard pool; 4,000-ft. test. Drlg. 1,515 ft.

Palo Pinto County

E. P. Wilson's No. 1 F. M. Watson, NW pt. of Sec. 10, Blk. 2, T.&P. Sur.; 3,250-ft. test. Drlg. 3,515 ft.

Shackelford County

Georgian Oil Corp.'s No. 1 Black ranch, C NE¼ of T.E.&L. Sur. 390, 10 mi. NE of Albany; Ordovician test. Drlg. 2,900 ft.

Stephens County

Jones Bros. Drlg. Co.'s No. 1 T.X.L., 660 ft. N and E lines SE Sec. 3, Blk. 3, S.P. Sur.; 4,050-ft. test. Loc.
Panhandle Ref. Co.'s No. 1 Frank Magers, SE Sec. 1, Blk. 3, S.P. Sur., 1¾ mi. N of Fagg area. Fsg. S.R. 2,410 ft.
Pitzer & West and Brazos-Young Oil Corp.'s No. 1 H. Compton, SW SW Sec. 9, O.A.L. Sur., 1 mi. SE of Loving pool; 3,600-ft. test. R.U.S.T.

Taylor County

Texas Pacific Coal & Oil Co.'s No. 1 N. A. Reidenback, 990 ft. from N and W lines of Lot 19, Lge. 146 County Sch. Lds. Rng. 10-in. csg. 1,825 ft.
J. C. Turner's No. 1 E. A. Shepard, NE SW Sec. 19, B.A.L. Sur. S.D.O. 1,690 ft.

NORTH TEXAS WILDCATS

Archer County

L. T. Burns' No. 1 Munchrath, SW cor. E½ Lot 22, Blk. 4, Clark & Plumb subd. Spdg.
Clark Cox's (Deep Rock Oil Co.) No. 1 J. M. McCarty, NW cor. C. C. Brown, Abst. 20, Drlg. 4,875 ft.
Continental Oil Co.'s No. 1 L. F. Wilson, NE cor. SW¼ Sec. 20, H.&T.C. Sur. (1½ mi. E of Hull-Silk). 6⅝-in. 5,138 ft. T.D. 5,250 ft.; test S.G.; treated 6,000 gal. acd.; perf. csg. 4,317-24 ft.; test wtr.; cem. W.O.C.
Hedrick Oil Co.'s No. 1 L. W. McCrory, SW cor. Lot 2, Blk. 94, A.T.N.C.L. Sur., 2½ mi. SE of Mankins pool. Drlg. 4,388 ft.
Roeser & Pendleton's No. 1 J. R. Parkey, Sec. 11, Blk. 3, H.&T.C. Sur. (north outpost to Mankins deep pool). Drlg. 4,918 ft.

Baylor County

Hattie B. Madden's No. 1 J. J. James, 2,000-ft. test located 1,650 ft. from N and 150 ft. from E lines of Sec. 150, T.&N.O.R.T. Sur. Drlg. 1,250 ft.
Hall Jordan's No. 1 F. C. Green, C Lot 29, J. E. Hix Sur., Abst. 1,376 ft. Drlg. 1,800 ft.

Clay County

Apache Oil Co.'s No. 1 W. A. Henderson, SE NW cor. of 3, Hernandez Sur., Abst. 185, O.S. 1,140-50 ft.; tstg.
O'Brien & Childs' No. 1 W. C. Heard, NE cor. of P. Osborne Sur., Abst. 369. Drlg. 1,100 ft.

Cooke County

G. V. Minnish's No. 1 Stout & Brewer, S½ of Brewer tract, J. Rodriguez Sur., Abst. 880. Drlg. 1,400 ft.
Mudge Oil Co.'s No. 1 Bonner, 330 ft. from S and E lines of E 30 ac. of W 61 ac. of S 101 ac., A. Emanuel Sur., Abst. 1196. Drlg. 2,180 ft.
C. E. Sykes' No. 1 H. Christian, 1,000 ft. from W and SW lines, J. P. Bailey Sur., Abst. 70. S.D. 3,382 ft.

Denton County

Jones Drlg. Co.'s No. 1 H. Chapman, L. Moore Sur., Abst. 824. T.D. 1,800 ft.; P.B. 1,634 ft.; to perf. csg.

Foard County

Ohio Oil Co.'s No. 1 M. E. Rasberry, NE cor. Sec. 26, S.P. Sur., 5,000-ft. test. Drlg. 1,750 ft.

Hardeman County

Carter & Taylor's No. 1 Norton, NW cor. 91-ac. tr. in Blk. 3, Robt. Young Sur., 16 mi. N Quanah. Drlg. 1,770 ft.
Norris & Gilbert's No. 1 Robert Weekley, SW SE Sec. 87, Blk. 16, H.&T.C. Sur. Drlg. 1,922 ft.

Montague County

W. B. Omohundro's No. 1 Seay, Sec. 32, Blk. 4, H.&T.C. Sur. (5,500-ft. test). Cong. 5,696-5,705 ft.; L. & cong. S.O. 5,686-5,706 ft.; rny. 6⅝-in.; filled up and flwd. oil on 30-min. D.S.T.; 6⅝-in. 5,289 ft.; sat. cong. 5,689-5,706 ft.; flwd. 240 bbl., 3 hrs.; ½-in. ck.
Wm. J. Payne's No. 1 T. M. Baker, NW¼ Lot 42, W. J. Wells Sur., Abst. 844, 5,000-ft. test. Drlg. 2,730 ft.
Ramsey Pet. Corp.'s No. 1 W. H. Magee, A. C. Davis Sur., just outside of town of Montague. Drlg. 770 ft.
Stanolind O. & G. Co.'s No. 1 McCool, NW cor. Jacob Lenow Sur. (½-mi. W outpost to Rogers field). 6⅝-in. 5,233 ft.; W.O.C.; D.S.T. 5,236-55 ft.; flwd 345 bbl., 3 hrs.; ¾-in. ck.; S.I.
F. K. Williford's No. 1 W. M. Goldsmith, C of Blk. 13, Wallace Sur., in Bonita townsite. Loc.

Wichita County

B. C. E. Dev. Co.'s No. 1 F. P. Warren, NE cor. W. J. Smith Sur. Loc.
S. H. Fagadau's No. 1 A. D. Potts, NE cor. Sec. 4, Blk. 7, H.&T.C. Sur. Basal 3,989-4,035 ft.; tstg.
E. C. Harlin, Jr., et al's No. 1 I. H. Kemner, SE cor. Blk. 28, Lge. 1, Denton Co. Sch. Lds. (5,200-ft. test). Drlg. 4,414 ft.

Wilbarger County

Amerada Pet. Corp.'s No. 1 B. Goodpasture, Sec. 35, H.&T.C. Sur., Blk. 15 8,000-ft. test. Drlg. 475 ft.
Lawsonia, Inc.'s No. 1-BB W. T. Waggoner est., SE pt. of Sec. 50, Blk. 14, H.&T.C. Sur. Drlg. 875 ft.

Young County

F. T. Conner's No. 1 Wright McClatchey est., SW cor. Sec. 284, T.E.&L. Sur. Drlg. 1,850 ft.
Henry Craig's No. 1 Ben Schegel, 56-ac. lse. in SE Sec. 79, T.E.&L. Sur. O.S. 696-98 ft.; I.P. 11 bbl.
H. W. Dyer's No. 1 M. G. Cheney, M. L. Terry Sur., Abst. 1261. Drlg. 1,025 ft.
K. R. March's No. 1 Ed Burton, NE cor. Blk. 99, J. A. True Sur., Abst. 1640, 4 mi. SE Graham; 4,250 ft. test. Drlg. plug 3,804 ft.
A. T. Strong et al's No. 1 E. C. Stovall Sec. 2946, T.E.&L. Sur. (4,800-ft. test) T.D. 4,805 ft.; 5⅛-in. csg. 4,728 ft.; W.O.C.

MISSISSIPPI

Attala County

P. & M. Oil Co.'s No. 1 J. A. McMillin, 300 ft. SW cor. SE SE Sec. 26-13n-5e. Spdd.

Clarke County

Ark.-Miss. Oil Co.'s No. 1 State, C SE SE Sec. 16-2n-16e. Spdd.

Copiah County

G. C. Koch's (former Triangle Drilling Co.) No. 1 W. W. Broome, 153 ft. SW cor. SW SE Sec. 1-10n-8e. Drlg. sd. sh. 2,139 ft.
S. J. Wheeless' No. 1 Columbia Mutual Life Ins. Co., C NE NE Sec. 19-1n-3w. Set 10¾-in. csg. 861 ft.; drlg. 1,210 ft.

Holmes County

Allied Pipe Line Co.'s No. 1 Ellis, C NE SW Sec. 18-14n-4e. Drlg. 816 ft.

Humphreys County

Fohs Oil Co.'s No. 1 Holaday, C SW SW Sec. 5-13n-3w. Loc.
J. B. Moncrief et al's No. 1 State, 2,490 ft. E line, 150 ft. N line of Sec. 9-15n-2w., Tent. loc.

Issaquena County

W. E. Hall's No. 1 Irby Charping, approx. C NE NW Sec. 29-10n-8w. Spdd. 20 ft.

Itawamba County

G. C. Grasty et al's No. 1 Ky. Lbr. Co., 1,320 ft. E, 660 ft. S, C Sec. 7-10s-10e. Twisted off D.S.; skd. 24 ft. S and spd.; set 10¾-in. csg. 170 ft.; S.O. 1,500 ft.; T. Trenton L. 1,600 ft.; drlg. L. 2,525 ft.

Madison County

E. L. Foster's No. 1 Haffey, NE cor. S½ Lot 5, Sec. 8-10n-5e. Drlg.
Ryan & Anderson's No. 1 Parkinson, C NW NE Sec. 23-9n-1w. Spd.
Ralph A. Johnston's No. 1 Ray & Dinkins, C SW SW Sec. 14-10e-3w. M.I.M.

Monroe County

Wilimut G. & O. Co.'s No. 1 Roberts, NW¼ Sec. 18-13s-17w. D.S.T. 2,410-30 ft.; Amory gas zone, dry; S.G. 2,844-52 ft.; hard cmtd. sd., odor oil 2,821-72 ft.; D.S.T., no results; ran Schlumberger and set 7-in. csg. 2,810 ft.; T.D. 2,879 ft.; flwd. small amt. gas and bailed to bttm.; shut in and opened well intermittently; no pressure inc.; shot with dynamite; built up pr. 100 lb.; W.O.

Pike County

S. R. Crouch's No. 1 Cupit, 360 ft. N, 660 ft. W, SE cor. NE SW Sec. 25-2n-7e. Set 6-in. csg. 729 ft.; drlg. 2,436 ft. sdy. sh.

Prentiss County

Home Dev. Co.'s No. 1 Mrs. A. Allen, Sec. 8-7s-9e. Drlg. L. 1,751 ft.

Sharkey County

Eureka Pet. Co.'s No. 1 W. H. Cooper, 1,980 ft. S, 660 ft. W, NE cor. Sec. 13-14n-6w. Set 10¾-in. csg. 571 ft.; drlg. bl. sh. 2,990 ft.

Simpson County

Cleve Love et al's No. 1 N. E. Garner, 300 ft. N and E of C Sec. 1-10n-17w. O.W.D.D.; O.T.D. 3,145 ft.; set 10¾-in. csg. 871 ft.; drlg. bl. sh. 5,526 ft.

Stone County

H. I. Morgan's No. 1 Dantzler Lbr. Co., NW SE Sec. 8-4s-12w. Drk.

Warren County

W. O. Allen's No. 1 J. W. Culley, 1,980 ft. NW cor. NW¼ Sec. 6-13n-3e. Set 10¾-in. csg. 983 ft.; T.D. 4,017 ft.; D.S. stuck; fsg.
H. C. Cummings et al's No. 1 T. H. Morrissey, C E½ W½ NE Sec. 8-17n-2e. Drlg. sd.&sh. 3,011 ft.

Wayne County

Hill & Hill and W. L. Stewart's No. 1 Kalmia Realty Co., C SW NW Sec. 5-7n-9w. Set 16-in. csg. 30 ft., spd. mch.; M.I. drk.

Yazoo County

Hill & Hill et al's No. 1 Kinkead Plantation, 1,796 ft. SE cor. NE¼ Sec. 31-11-3. 7⅝-in. csg. 128 ft.; T.D. 5,358 ft.; S.D. for repairs and couldn't get back in old hole; sdtrkd. at 450 ft.; T. Selma chk. 5,127 ft.; S.D.
Hassie Hunt's No. 4 A. G. Johnson, C NE NW Sec. 14-10-3. Set 16-in. csg. 60 ft.; drlg. 73 ft.
Edgar Johnson's No. 1-B Brumfield, C NW SW Sec. 1-10-3. Woodruff sd. 4,806-15 ft., oil; rng. 7-in. csg.; T.D. 4,826 ft.
Kingwood Oil Co.'s No. 1 R. E. Wilburn, 330 ft. NE cor. Sec. 31-12n-3e. Drlg. ch.&sh. 4,357 ft.
J. R. Lockhart et al's No. 1 Frank Brooks, W½ SE NW Sec. 17-10-2w. T. chalk 4,964 ft.; T. sd. 5,047 ft.; cd. 5,051-55 ft.; cores rec. 5,047-51 and 5,110-25 ft.; showed salty taste; T.D. 5,134 ft.; prep. sdtrk. by fish.
Nelson Bros.' No. 1 S. S. Stoner, C SE NW Sec. 2-11-5w. Spdg.
Slick-Urschel Oil Co.'s No. 2 Slick, 760 ft. N, 560 ft. W SE cor. SW Sec. 2-10-3. Set 16-in. csg. 66 ft.; 10¾-in. csg. 615 ft.; drlg. 1,712 ft.
Union Producing Co.'s No. 2 Herron, C SE SW Sec. 11-10-3. Set 16-in. csg. 38 ft.; W.O.C. 50 ft.
Union Prod. Co.'s No. 4 Perry, C SW NE Sec. 24-10-3. Set 16-in. csg. 50 ft.; Stevens sd. 4,886-4,906 ft.; Stevens sd. 4,944-63 ft.; stray sd. in Eutaw 4,976 ft.; D.S.T. 4,970-5,080 ft.; ⅝-in. cks. top and bttm.; rec. 2,100 ft. S.W. and drlg. mud cut with oil; cd. sd. in Tuscaloosa 5,570-90 ft. showing oil.; D.S.T. 5,545-90 ft., ⅝-in. cks. top and bttm., rec. 560 ft. heavy oil and 720 ft. oil and S.W. in 10 min.; T.D. 6,133 ft.; set 7-in. csg. 5,035 ft. to test Eutaw sd.; W.O.C.
Union Producing Co.'s No. 5 Stevens, C SW NE Sec. 11-10-3. Cg. 4,457 ft.

Three Good Producers and New Locations Mississippi

By GEORGE WEBER

JACKSON, Miss., Mar. 25.—Three good producers, extending production westward in the Tinsley field of Yazoo County, and a number of new wildcat locations throughout Mississippi marked developments of the past week. Failures in two deep wildcats brought abandonments in Issequena and Yazoo counties.

A total of seven actual and tentative wildcat locations were reported over the week in Mississippi, one new test in Georgia, and rumored drilling activity due shortly in Northwest Albama basin, where leasing has been strong. Holmes, Humphreys, Madison, Perry, and Stone counties shared the new and proposed Mississippi exploration. Exchange Oil Co. is reported planning to drill to 4,500 ft. in Section 6-16n-1e in Holmes County and has staked a tentative location, with no spudding date announced.

Humphreys County led in projected new development with three new wildcat locations scheduled to begin the first week in April. Crawford & Hollandale have made location in Section 1-13n-4w for a test on a block largely held by Fohs Oil Co. and are planning to begin April 1. Fohs Oil Co. has staked No. 1 Holaday, Section 5-13n-3w, for spudding on the same date, and a rig is believed moving in to location. The third test, J. B. Moncrief and others' No. 1 State, is tentatively located in Section 9-15n-2w on a 28,000-acre block for spudding on April 6.

In Madison County, Ralph Johnson has staked tentative location for a wildcat in Section 32-11n-4e, on a 6,000-acre block, to drill to 5,000 ft. Fohs Oil Co. interests are believed planning a test in Perry County within the next 6 months. Stone County is entering the wildcatting picture with a location, H. I. Morgan's No. 1 Dantzler Lumber Co., Section 8-4s-12w. Derrick is being erected on the location, and the hole is projected to the Eutaw formation, which in that vicinity may carry operations as deep as 8,000 ft.

Active wildcatting increased during the past week, with the spudding of six wildcats previously reported as locations or rigging up. In addition to eight wildcats continuing active, four resumed drilling during the past week, after shutdown periods. The total of 18 active wildcats, plus several either shut down temporarily or due to spud shortly, brings Mississippi's exploratory activity to its highest point.

Tinsley Field

Completion of two of the best producers yet brought in at Tinsley highlighted the field's developments. Further irregularities in the Woodruff sand were revealed in a north outpost test illustrating the uncertainty of edge operations, due to faulting and to lenticular deposition of the producing horizons.

With the best Woodruff sand section drilled to date, Union Producing Co.'s No. 1 George Herron was completed last week with an initial production of 30 bbl. hourly through a 20/64-in. choke. The oil-bearing sand extended through 102 ft., from 4,440-4,542 ft. but the producing string was perforated through only 10 ft. in the bottom of the section. Slick-Urschel Oil Co.'s No. 1 Slick, with 60 ft. of Woodruff sand made an initial production of 44 bbl. hourly through a 20/64-in. choke. Hassie Hunt's No. 2 A. G. Johnson gaged 18 bbl. hourly through a ⅝-in. choke, with a closed-in pressure of 420 lb. on the tubing, which is high for Woodruff sand wells.

On the north edge Edgar Johnson's No. 1-B Brumfield encountered the Woodruff sand at 4,806-15 ft., about 100 ft. higher than the offset to the south, with the oil sand thinning from 34 ft. in the south offset to 9 ft. in the No. 1-B Brumfield.

Yazoo Wildcats

Following abandonment of Robert P. Lake's No. 1 Exum estate, in Section 13-11-2, northeast of Tinsley, attention is diverted to Kingwood Oil Co.'s No. 1 Wilburn, Section 31-12n-3e, in the extreme eastern tip of Yazoo County. The latter test is drilling the Selma chalk below 4,350 ft. It is running higher than the Lake test and the chalk is reported to be softer and more porous. The thickness of the chalk, which ran 700 ft. in the Lake test, may make the Eutaw or Tuscaloosa formations run low in this wildcat, although such a condition has not yet been proved, since the Kingwood test has drilled only 400 ft. to date.

The week's two wildcat abandonments marked the end to hopes of production in a likely structure in Issequena County, and to further oil production in a Yazoo County prospect. The Issequena test, Tatum-Dunbar and Shaddock's (Germany et al) No. 1 Mohanna, in Section 9-18n-3e, was abandoned at a total depth of 6,023 ft. in the Tuscaloosa formation, which showed water in a core cut at 6,008-22 ft. Interested parties held to belief 2 weeks ago that lower Eutaw or Tuscaloosa production might be found in the test, for the chalk ran high. No shows were reported in either the Selma chalk, Eutaw or Tuscaloosa.

Georgia Activity

In addition to No. 1 Gillican, now drilling, Georgia Resources, Inc., has staked location for a second test in Clinch County, Georgia, where its holdings approximate 75,000 acres. No. 1 Wilkinson, 2 miles north and 1 mile west of No. 1 Gillican, is due to spud shortly with materials being moved in. This is expected to precede an extensive drilling campaign for Clinch County. Added activity is implied from reports of geophysical activity in Brantley, Ware and Clinch counties, South Georgia.

MISSISSIPPI COMPLETIONS

Wildcat—Issequent County

Tatum-Dunbar and Shaddock's No. 1 Mohanna, 406 ft. north, 660 ft. west, SE cor. SW Section 9-18n-3e, total depth 6,023 ft., abandoned.

Wildcat—Yazoo County

Robert P. Lake's No. 1 Exum estate, 1,980 ft. NE cor. Section 13-11-2, total depth 5,328 ft., abandoned.

Tinsley—Yazoo County

Hassie Hunt's No. 2 A. G. Johnson, C SE NW Section 14-10-3, 432 bbl., ⅝-in. choke, tubing pressure 120 lb., total depth 4,860 ft. Slick-Urschel Oil Co.'s No. 1 Slick, 275 ft. south, 670 ft. west, NE cor. NW Section 11-10-3, 1,056 bbl., 20/64-in. choke, tubing pressure 135 lb., casing pressure 175 lb., Woodruff sand 4,535-90 ft., 6-in. casing 4,642 ft., perforated 4,538-80 ft., total depth 4,647 ft. Union Producing Co.'s No. 1 G. Herron, C NE SW Section 11-10-3, 732 bbl., 20/64-in. choke, casing pressure 133 lb., Woodruff sand 4,440-4,542 ft., 7-in. casing perforated 4,532-42 ft., total depth 4,557 ft.

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CRUDE-OIL PRICES IN REPRESENTATIVE FIELDS

Complete crude-price schedules are now being published in the first issue of each month. The last complete schedule was published in the March 7 issue. All changes in crude-oil-price schedules will be published completely in the first issues following the announcement of the changes. Following are representative crude-price schedules in barrels (42 gal.):

East Texas	$1.10
Conroe	1.37
Tepetate, Louisiana	1.03
Smackover, Arkansas, heavy	.73
Illinois basin	1.06
Pecos County, Texas	.78
Lance Creek, Wyoming	.77
Bradford, Pennsylvania	2.75

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

	Signal Hill, California*	Oklahoma, Kansas	Gulf Coast Texas
14-14.9	$.065	....	....
15-15.9	.65	....	....
16-16.9	.65	....	....
17-17.9	.65	....	....
18-18.9	.65	....	....
19-19.9	.69	....	$0.86
20-20.9	.73	$0.70	.88
21-21.9	.78	.72	.90
22-22.9	.82	.74	.92
23-23.9	.86	.76	.94
24-24.9	.90	.78	.96
25-25.9	.95	.80	.98
26-26.9	.99	.82	1.00
27-27.9	1.03	.84	1.02
28-28.9	1.07	.86	1.04
29-29.9	1.10	.88	1.06
30-30.9	1.14	.90	1.08
31-31.9	....	.92	1.10
32-32.9	....	.94	1.12
33-33.9	....	.96	1.14
34-34.9	....	.98	1.16
35-35.9	....	1.00	1.18
36-36.9	....	1.02	1.20
37-37.9	....	1.04	1.22
38-38.9	....	1.06	1.24
39-39.9	....	1.08	1.26
40-40.9	....	1.10	1.28

*Effective February 1, 1940.

Opportunities for Qualified Men in Fields Abroad

(Continued from Page 192)

news broadcasts owing to the fact that newspaper deliveries require 10 to 30 days. In the most isolated camps of Colombia and Venezuela groups of college men and others gathered around club house radios and listen to football broadcasts.

Most of the oil centers in all parts of the world have excellent air-mail connections. For example, air mail is delivered from the United States to South American fields, two or more times weekly, two to seven days being required.

The ability to get along with people who speak a different language, including those who belong to another race, is another phase of adaptability. Oil company managements in furtherance of the "good neighbor policy" are doing everything possible to establish friendly relations with the residents of the country in which they are operating. A "cocky" or intolerant attitude, typical of some Americans, is quickly sensed and resented by Latin Americans and is a liability to oil companies.

It is noteworthy in this connection that practically all of the foreigners employed in South American fields speak Spanish fluently. This of course is necessary in the case of those directing the work or associating with local residents. It is also felt that a working knowledge of the language aids in removing the most important barrier in establishing satisfactory social and commercial relationships. Several companies furnish Spanish instructors for employes and members of their families.

Finally, in reference to those employed in foreign countries, there is always the question, "How do they like it?" As has been indicated, some do not like it and are frank in saying so. Dissatisfaction being somewhat of an American trait anywhere, these complaints probably should not be taken too seriously. They hasten home as soon as their first period of employment is completed. Later many realize that the foreign work had many advantages which they overlooked and they return provided their services have been satisfactory. Among them are a number with many years of service having a training and background which entitle them to be included among the most interesting personalities of the oil world.

Treating High-Sulfur Cracked Distillate With Acid Process

(Continued from Page 188)

be used either in charge or booster-pump service. A Stratco standard horizontal high-dispersion contactor is used to contact caustic with water-washed distillate.

Positive displacement pumps of the rotating plunger type are used in acid sludge service. These pumps are controlled by liquid level controllers actuated by the differential pressure between the naphtha space and acid space of the sludge settlers.

The only special piping is the Everdur bronze lines which handle weak acid solution.

The valves throughout the unit are the plug-cock type except those on ammonia equipment, instruments, and sample lines, which are the usual type required for such service.

Instrumentation

The instrumentation of the treating unit gives maximum flexibility in control and reduces operating attention to a minimum. The instrument board is one of the largest which has been installed in a Stratcold plant and consists of a single unit. Before this board the operator has a complete, continuous picture of each step of the operation.

Building

The building which houses equipment indicated in the accompanying plot plan is steel-frame and corrugated-asbestos construction. It is divided into three rooms: contactor, compressor, and electrical. The middle or electrical room runs through the width of the building and is sealed off from the other two rooms. Four fixed steel-sash windows fitted with polished wire glass are provided in the wall on the compressor room side. The wall on the contactor room side is solid concrete. The room has only outside entrances and is kept under slight fresh-air pressure by a blower to protect against the possible entry of inflammable gas.

Operating Results

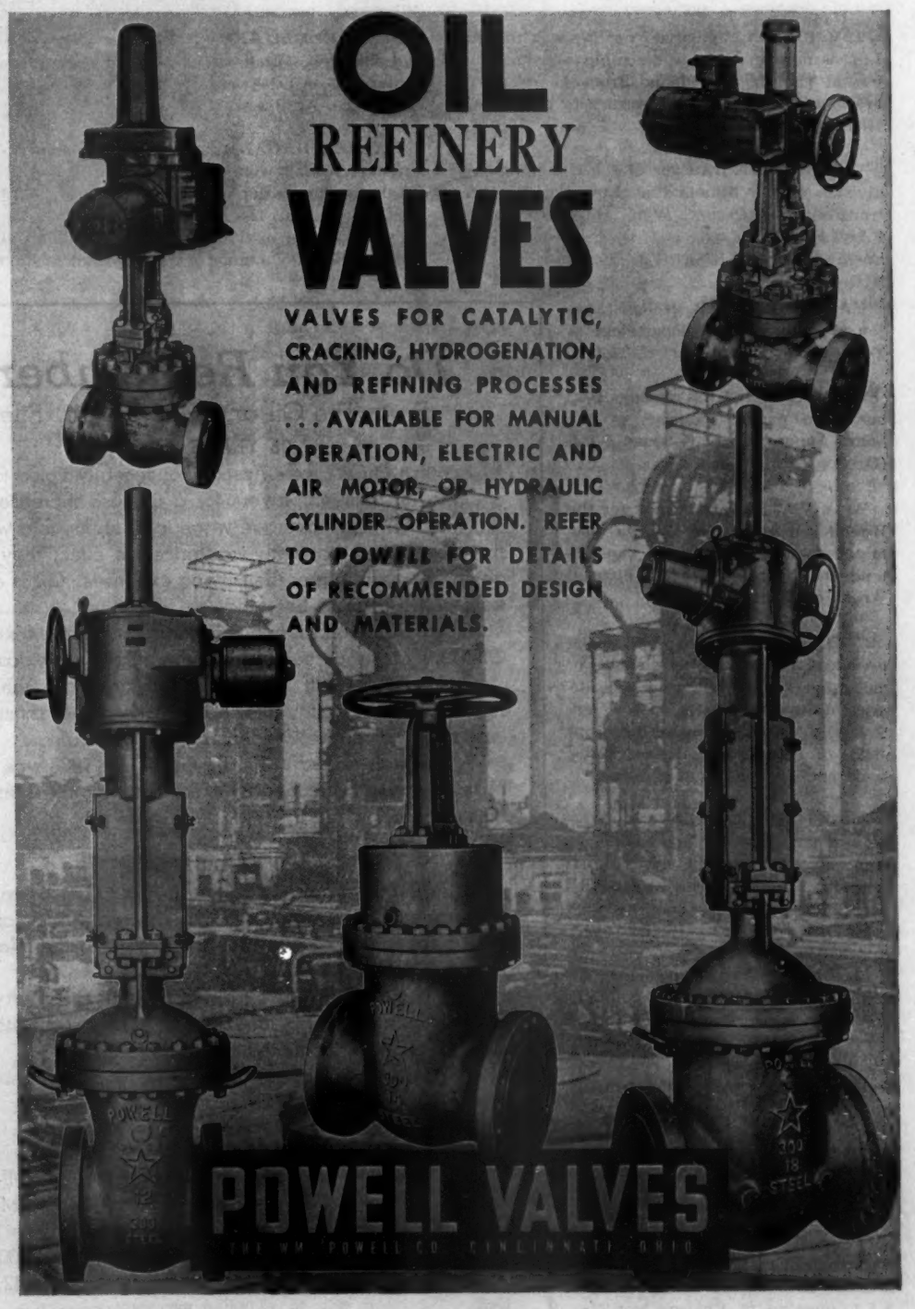
From the first, the operation of the plant has been extremely smooth and free of difficulties.

The performance of the unit is illustrated by the data in Table 1 which covers a number of test periods. The several changes in operating conditions were made to explore the flexibility of the unit and to find the economic level for the degree of desulfurization required. When test number seven was made, the refinery gasoline sulfur balance required only 0.35 per cent sulfur in the heavy cracked naphtha.

The apparent octane loss on these tests was approximately 1.0.

Power consumption per barrel of charge varies between 0.90 and 0.70 kw. with 0.46 and 0.26 kw. of these respective figures representing power for refrigeration.

Consumption of caustic soda for neutralization appears to have stabilized between 0.060 and 0.080 lb. (dry) per bbl. of feed.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Personal Paragraphs

H. D. BROWN, JR., production superintendent, Brundred Oil Corp., Oil City, Pa., is spending a month on the company's properties in Oklahoma and Kansas. He is temporarily at Garnett, Kans.

J. M. RUSSELL, engineer for Sarawak Oilfields, Ltd., is now en route to his company's headquarters at The Hague, Holland, from where, after a brief stopover, he plans to return to his office at Miri, Sarawak, Borneo.

W. J. HAGIST, manager of the Kevin-Sunburst division of the Illinois Pipe Line Co., has been transferred to Casper, Wyo. He succeeds ROY FAWLEY, promoted, and is succeeded in the Shelby office by JOSEPH LUTZ.

HAROLD BECWAR, geologist, has joined the geological department of Texas Co. at Corpus Christi, Tex.

WILBUR CLARKE, Coleman, Tex., has been named manager of the Santa Anna office of Coleman Oil & Gas Co.

W. A. WATSON, farm boss for the Humble Oil & Refining Co., was promoted to assistant district superintendent in the Hobbs, N. M., district, West Texas division.

C. H. LIEB, of New York, vice president of Creole Petroleum Co. and other foreign operating subsidiaries of Standard Oil Co. of New Jersey, is in Venezuela inspecting properties of Standard Oil Co. of Venezuela and Lago Petroleum Corp.

BRANTLEY JACKSON, in the land department of Magnolia Petroleum Co. and recently stationed at Jackson, Miss., has been transferred to St. Joseph, Mo., where he will check the Forest City basin area.

ED HUNT, district geologist of Texas Co. for the Rocky Mountain area, has been transferred to Calgary, and H. E. Christensen, of the Wichita, Kans., office, has been transferred to Denver, Colo., to take his place.

R. A. (DICK) WOTOWITCH is now located at 90 West Street, New York City, where he is engaged in the marketing of petroleum products. Mr. Wotowitch was one of the organizers of the 25-Year Club which held its first dinner at the annual A.P.I. meeting in Chicago last November.

W. J. CHRISTIAN, former chief enforcement officer with the Texas Railroad Commission, at Kilgore, has been transferred to Midland, succeeding GORDON BIGHAM.

DR. GARRETT KEMP, consulting geophysicist and engineer of Dallas, Tex., will conduct a 3-day conference on practical geophysics at Texas A. & M. College, April 4 to 6.

WALTER H. GANT, independent producer of Ardmore, Okla., won two championships at the Southwest Exposition and Fat Stock Show held in Fort Worth, Tex., last week. His horse Beau Venture was winner of the three-gaited championship and Bourbon Rex winner of the fine-harness stake.

NOEL ROBINSON, vice president of South Penn Oil Co., Pittsburgh, Pa., was named manager of the company's southern division at the annual meeting.

K. A. MYGDAL, geologist with the Pure Oil Co. and stationed in the North Texas district at Wichita Falls, was the speaker before the Fort Worth Geological Society luncheon Monday, March 25, at Fort Worth, Tex.

RUSSELL CARTER, in the drilling department of British Controlled Oilfields, who has been studying drilling methods and equipment in California and Mid-Continent fields during recent months, sailed from New York for Venezuela.

VICTOR F. PALMER, who has been treasurer of Standard Oil Co. of California for several years and who maintained offices at the headquarters of the company in San Francisco, has resigned.

E. L. DAVIS, Texas Co., was named vice chairman for Los Angeles Basin A.P.I. Division of Production; R. B. HODGSON, Tide Water Associated Oil Co., was elected vice chairman for the Coastal District; and D. T. HOENSHELL, Kettleman North Dome Association, with offices in Avenal, was elected chairman for San Joaquin Valley, at the Pacific Coast district meeting in Los Angeles. W. G. COREY was reelected treasurer and D. S. KILGOUR was reelected secretary.

Do You Remember?

From The Oil and Gas Journal Files

25 YEARS AGO

Scottish Oil Workers Association recently voted to enforce a claim on their employers for a 6-pense increase in their daily wage. Their average wage is 30 shillings a week and the men claim that with war prices in effect they are not getting enough to pay their living expenses. Oil is extracted from shale beds in Scotland.

E. W. Hammond is placed in charge of the Mexican-Gulf Oil Co.'s oil properties and business in the Mexican fields.

David W. Moffitt resigns his position with the Kansas Refining Co. at Coffeyville, Kans., to become assistant general manager of the Cosden refineries in Tulsa.

A gas well drilled in Findlay, Ohio, in 1838 was recently plugged and abandoned to make way for the Illinois Pipe Line's office building.

20 YEARS AGO

With Pennsylvania oil selling for $6.10 per barrel one oil property in that state recently was sold on a basis of $15,000 per barrel of daily production, according to the Wall Street Journal.

The Continental Oil Co., a Standard subsidiary in the Rocky Mountain fields, declares a 200 per cent stock dividend. The stock is quoted at $645 per share.

The Standard Oil Co. of New Jersey's stock is now listed on the New York Stock Exchange.

10 YEARS AGO

Siliceous lime pay is discovered in the Voshell pool in Kansas. New pool is opened in Clare County, Michigan. I. T. I. O.'s Mary Sudik well in Oklahoma City is blowing wild and producing 2,000 bbl. of oil per hour and 200,000,000 cu. ft. of gas per day. Darst Creek, Texas, has 42,000-bbl. well.

ARTHUR IDDINGS, general manager of International Petroleum Co., has left Talara for Lima, Peru.

EARL GRIFFIN has been transferred from Odessa, Tex., to become district superintendent of Phillips Petroleum Co.'s properties at Oklahoma City.

JACK GUITEMAN, formerly in the Fort Worth offices of Texas Co., has been transferred to Midland, Tex., where he will act as scout for the West Texas district.

W. T. BOSTWICK, in the land department of Texas Co. and formerly stationed in the West Texas district at Midland, was recently transferred to the North Texas district at Wichita Falls.

ANDREW F. SCHOEPPEL, Ness City, Kans., oil operator and attorney, and chairman of the Kansas Corporation Commission, was reelected chairman of the commission for a 4-year term.

HUGH D. DRISCOLL has been elected president of Gulf Stream, Inc., following the death of M. C. Driscoll, and WALTER G. DODD has been named executive vice president and general manager, and A. D. DYESS secretary.

W. F. HOLBROOK, of the aviation department of Socony-Vacuum Oil Co., Inc., New York, was in Dallas, Tex., last week on a tour of inspection. He left at the close of the week with E. E. Ray, aviation sales department of Magnolia Petroleum Co., to inspect fields and airport facilities throughout the Southwest.

H. F. BERG, petroleum engineer with Tide Water Associated Oil Co., Cayuga, Tex., has been transferred to Magnolia, Ark.

THOMAS B. WILSON, Bradford, Pa., producer and attorney, has announced his candidacy for the state senate on the Republican ticket.

G. P. DALL, president of Valvoline Oil Co., was elected to the board of the American Thermos Bottle Co. at the annual meeting last week in Cincinnati.

J. E. BRANTLY, of Los Angeles and Dallas, president of Drilling & Exploration Co., Inc., is in Brazil inspecting operations which his company is carrying out under contract with the Brazilian Government. He is expected to return to this country late in April or early May.

CARL V. SCHLAET, of Westport, Conn., is spending a few days at his eastern home before returning to Evansville, Ind., where he is actively interested in the Illinois basin development. Prior to expropriation Mr. Schlaet spent most of his time in Mexico, where he developed considerable production.

W. E. SCHOENECK, with Ohio Oil Co., was elected chairman of the Ark-La-Tex chapter of the American Petroleum Institute at a regular meeting last week. C. W. HUGHES, of Arkansas Fuel Oil Co., was elected vice chairman and PHIL D. BAKER, Standard Oil Co. of Louisiana, was named secretary-treasurer. Mr. Schoeneck succeeds L. M. MOFFITT, Triangle Drilling Co., first chairman of the chapter.

Hasn't Jumped Around

A. S. Russell, who recently was elected a vice president of the Standard Oil Co. of California, is not one of the kind that jumps around, as is evidenced by the fact that next year he will have completed 30 years of unbroken service with the company. He joined it in 1911, when he got a job as an engineer in the construction of the El Segundo refinery in southern California. Later he was employed in the same capacity at the Seguro refinery, in Bakersfield, Kern County, then at the Richmond refinery, in the San Francisco Bay region. In July 1918 Mr. Russell was advanced to chief engineer of the manufacturing department. While filling that post he maintained offices at the Richmond refinery. In June 1926 he was appointed vice chairman of the manufacturing committee, and one year later, while still serving in that capacity, he was made manager of the El Segundo refinery.

A. S. RUSSELL

Mr. Russell remained at El Segundo until he was elected to the company's board of directors January 1, 1931. He was chosen a vice president January 1, 1940, retaining meanwhile his post as a director. Mr. Russell resides in San Francisco, and his headquarters are at the principal offices of the company in that city.

W. E. BROWN, petroleum engineer with Tide Water Associated Oil Co., has been transferred from East Texas to Midland in West Texas.

M. M. ROGERS, farm boss for Humble Oil & Refining Co., was promoted to assistant district superintendent in the Wasson district, West Texas division.

JOHN CARTER, vice president of Gem Oil Co., Houston, Tex., and FRANK C. ADAMS, geologist for the same company, have resigned and are operating independently.

RALPH A. LIDDLE, Fort Worth, Tex., formerly division geologist there for Pure Oil Co., is in New York preparing a geological report on a concession in Ecuador.

C. C. NARAMORE of New York, secretary of the petroleum division of the A.I.M.E., was in East Texas and Houston recently laying plans for organization of an East Texas chapter of the institute.

JOHN LUCAS, vice president of Tiki Exploration Co., New York, is opening an office in Shreveport, La., and will transfer to that city during the drilling of a deep wildcat well at Haynesville.

FRED P. SHAYES, geologist for United Gas Co. at Beeville, Tex., was elected president of the South Texas Geological Society last week. GENTRY KIDD, geologist for Stanolind Oil & Gas Co. at San Antonio, was named vice president and ROBERT N. KOLM with Atlantic Refining Co. at San Antonio, was elected secretary-treasurer.

JERRY McCARTNEY, who has been assistant foreman of maintenance for Shell Oil Co., Inc., in the San Joaquin Valley, California, for some time, has been promoted to foreman in Los Angeles Basin and will maintain offices in Long Beach.

CLARK G. WALKER, of General Petroleum Corp., has been appointed branch manager of the Oakland division, having been recently transferred south from the Pacific Northwest in Washington and Oregon.

SHIFTS: E. F. BERRYMAN, engineer, Stanolind Oil & Gas Co., from Clarendon, Tex., to Stratford, Tex.; W. R. GATES, superintendent, Taylor Refining Co., from Grayville, Ill., to Centralia, Ill.; F. M. WATKINS, superintendent, Tide Water Associated Oil Co., from Coalinga, Calif.; to Culver City, Calif.; HENRY CARTER REA, geologist, Seaboard Oil Co., from Dallas, Tex., to Tuscaloosa, Ala.; J. M. HOWELL, O. W. Dyer, Jr., Drilling Co., from Eunice, La., to Fouke, Ark.; JAMES B. HAMMOND, president, Hammond Oil Co., from Meridian, Miss., to Mobile, Ala.; HOMER C. MOORE, geologist, Texas Co., from Mount Vernon, Ill., to West Frankfort, Ill.; C. M. COLEMAN, drilling contractor, from Memphis, Tenn., to Louisville, Ky.; H. N. K. BROOKINGS, geologist, Phillips Petroleum Co., from Oklahoma City to Enid, Okla.; C. A. MOON, Deutsche Vacuum Oel, from Hamburg, Germany, to New York.

W. J. McCOY has been elected treasurer of the Southern California Gas Co. and JOSEPH SODOMA has been elected assistant secretary.

HOWARD F. WALSH, Fort Worth, Tex., has been named to the board of directors and made assistant secretary and treasurer of the F. H. E. Oil Co. of Fort Worth, it was announced by W. M. FLEMMING, president of the company.

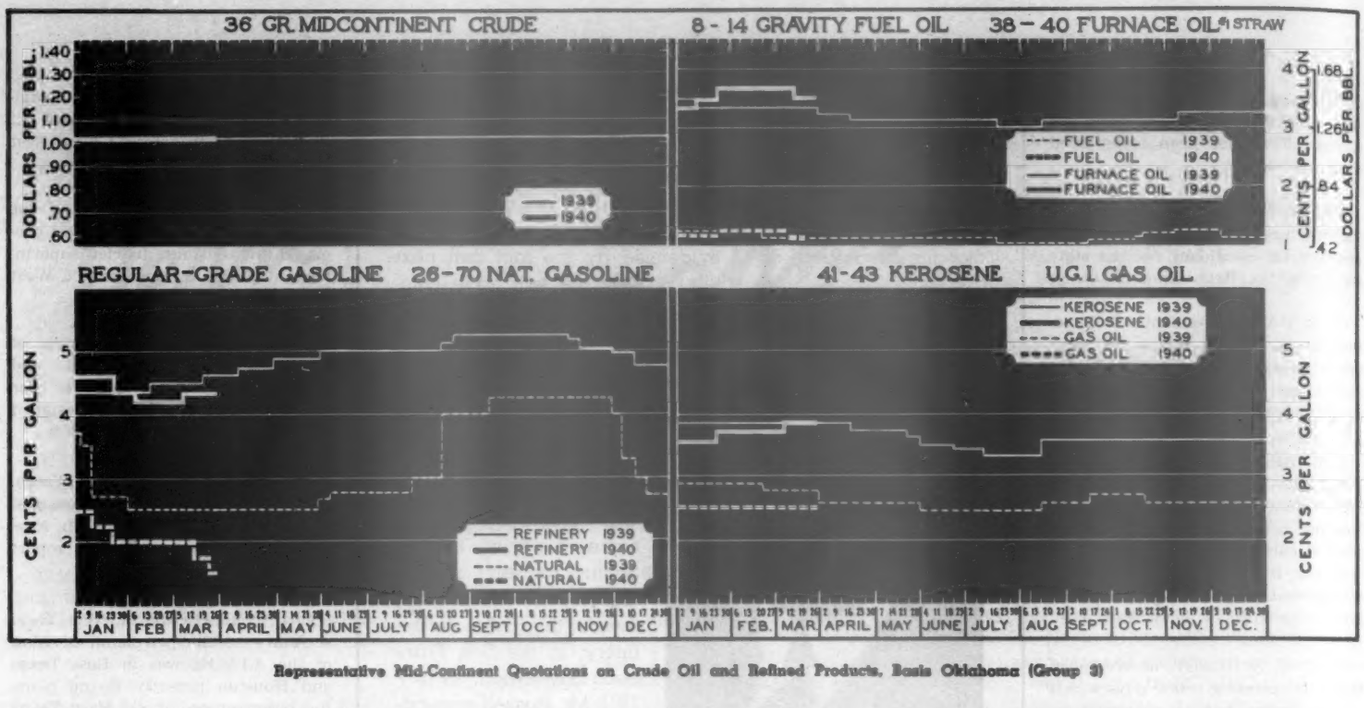
D. FLEMING, exploration engineer, and T. R. WHITTAKER, mechanical engineer for the Caribbean Petroleum Corp., left New York for Venezuela, following an extended trip through the oil fields of California, the Gulf Coast, and Mid-Continent.

EDWARD TROSTEL, of Union Oil Co., has been transferred in an advanced capacity from the Los Angeles office to the company's Richfield office and will have charge of all fields in the eastern end of Los Angeles Basin. E. C. BABSON has taken Mr. Trostel's position in Los Angeles and has moved from the Dominguez office.

DR. E. L. DeGOLYER, professor of geology of the University of Texas, delivered the dedicatory address at the Colorado School of Mines on Engineer's Day when the new home for the geology and geophysics departments of the university was dedicated.

E. L. DAVIS, Texas Co., was named vice chairman for Los Angeles Basin, A.P.I. Division of Production; R. B. HODGSON, Tide Water Associated Oil Co., was elected vice chairman for the coastal district; and R. T. HOENSHELL, Kettleman North Dome Association with offices in Avenal, was elected chairman for San Joaquin Valley, at the Pacific Coast district meeting in Los Angeles. W. C. COREY was reelected treasurer and D. S. KILGOUR was reelected secretary.

BURDETTE BLUE, president of the Indian Territory Illuminating Oil Co., Bartlesville, Okla., has been renamed chairman of the public relations committee of the Independent Petroleum Association of America. The committee, named by FRANK BUTTRAM, association president, follows: FRANK M. PORTER, vice president, Wirt Franklin Petroleum Corp., Oklahoma City, vice chairman; R. A. BROOMFIELD, JR., Barnsdall Oil Co., Los Angeles, Calif.; C. A. JOHNSON, president, Holly Oil Co., Los Angeles; T. C. JOHNSON, Wichita, Kans.; HARRY LEONARD, Harry Leonard, Inc., Roswell, N. M.; R. J. DAUGHERTY, Bartlesville, Okla.; R. C. JOPLING, vice president, Phillips Petroleum Co., Bartlesville; FRANK LONG, vice president, Oklahoma Natural Gas Co., Tulsa; J. S. NOLAND, Barnsdall Oil Co., Tulsa; JAKE L. HAMON, Cox & Hamon, Dallas, Tex.; JOHN W. NAYLOR, Fort Worth, Tex.; and CHARLES A. WARNER, Houston Oil Co. of Texas.



Representative Mid-Continent Quotations on Crude Oil and Refined Products, Basis Oklahoma (Group 3)

Natural Gasoline Takes Another Dive In Group 3; Motor Fuel Steadier

By T. F. SMILEY

NATURAL gasoline took another dive in the Group 3 market in the past week, losing a quarter cent in both Oklahoma and Texas. This carried the 26-70 grade to 1¼ cents in Texas and 1½ cents in Oklahoma. These are the lowest prices recorded since the chaotic market of June 1934, when sales were made in Oklahoma at 1 cent a gallon.

The sharp drop was foreseen as inevitable weeks before it came, for with Texas stocks already out of hand the seasonal decline in demand arrived. Refiners were turning to the making of summer-specification motor fuel, with its reduced requirements for the volatility provided by natural gasoline. Small manufacturers in Texas without facilities for either storage or stabilization, and some of the larger concerns without contracts to take care of their output, faced a situation in which they apparently had no recourse save to slashing of prices in order to move their accumulating material. There were said to be no distress stocks in Oklahoma, but prices had to undergo the same reduction as those in Texas to keep markets from being flooded with the distress material from the latter state.

Jobbers Buying Liberally

Jobbers were reported to be buying stabilized casinghead liberally at the current bargain prices. They are taking the 18-lb. grade now, and as warmer weather comes will switch to 14-lb. and 12-lb. if the low prices continue. This material is blended with all grades of refinery gasoline.

Group 3 motor fuels were slightly firmer, but not enough to change prices further than to make it a little harder to obtain concessions. There is a deepening feeling that unless gasoline prices go to a definitely profit-yielding level there will be more shutdowns. One Oklahoma refiner, who is fortunately situated with regard to crude supplies and who has been able to dispose of his third-grade gasoline at an average of 4 cents a gallon, declares he finds himself operating at a loss and that unless conditions improve he will have to close his plant. His experience is believed to be typical.

While the nation's gasoline stocks in the week ending March 16 rose to the unprecedented height of 100,616,000 bbl., breaking through the top of the graph used for recording their weekly movement, those in the Mid-Continent continued the decline which had begun the preceding week. The Mid-Continent stocks dropped 146,000 bbl. in the 2 weeks following March 2.

Mid-Continent refiners are looking forward hopefully to the expansion of tractor work on farms as a probable aid in their efforts to establish better gasoline markets. The higher-compression engines installed in modern tractors are steadily increasing the demand for low-octane gasoline. In addition to the rising percentage of tractors that use gasoline as fuel it is pointed out that the number of tractors in use on farms is growing fast. Contributing to their fuel requirements too is the fact that tractors are called upon to perform a much wider variety of tasks than formerly. The tractor promises to go far toward compensating for the dwindling demand for low-octane gasoline as a fuel for motor cars.

Lubricating Oils Off

Yielding to the pressure created by lower prices for lubricating oils in the eastern markets, Mid-Continent bright stocks were reduced 2 cents and neutrals a half cent. Demand for Mid-Continent products was described as steady.

Tractor fuels and kerosene were strong, and quotations on the former were tightening, with the call for the 46-48 grade particularly urgent. This is a premium grade and few refiners make it. Heating oils disclosed little change, but such as there was pointed in the direction of easier prices. The higher grades were sharing a little of the strength of kerosene. Quotations on wax were unchanged, and the market was steady.

Refined Oil Market Barometer

Overheavy inventories softened the gasoline market in coastal areas; slightly improved tone in interior. Natural gasoline at lowest prices since 1934. Lubricating oils believed to be leveling off following protracted decline. Kerosene and tractor fuels continued to gain strength. Furnace oils showed firmness in North Atlantic territory, but were less active in other regions.

MID-CONTINENT. Naturals continue decline. Gasoline slightly firmer. Lubricating oils off.

EAST COAST. Gasoline unsteady under pressure of excessive stocks. Light fuels firmer.

GULF COAST. Gasoline inactive. Kerosene strong. Fuel and burning oils easier.

PENNSYLVANIA. Lubricating oils continue soft. Fuel oil weakening. Gasoline lacks life.

CALIFORNIA. Gasoline weak. Fuel oil, diesel, and gas oil soft, with prices unchanged.

CHICAGO. Gasoline soft. Kerosene and tractor fuels firm. Heating oils holding fairly well.

Crosscurrents in East Coast Gasoline and Fuel Prices

By H. STANLEY NORMAN

NEW YORK, Mar. 25.—Gasoline and fuel-oil prices continued to move in crosscurrents last week in the northeastern section of the country where weather conditions exerted a depressing influence on the early spring operation of automotive vehicles. The half-cent reduction in tank-wagon and tank-car motor-fuel prices in eastern New York State and in the New England section on March 14 was extended to western New York and to previously unaffected sections of Pennsylvania on March 19. The Philadelphia tank-wagon price for regular motor fuel was dropped 1.2 cents per gallon on March 14 by Atlantic Refining Co. to meet a particularly acute competitive condition there, and the drift into lower marketing ground was followed by other large sellers.

The spot tank-car market for motor fuel in territory served from New York Harbor was reported "very sloppy" at the end of last week. Motor fuel of 72-octane specification was reported freely available in the Brooklyn district at 5⅝ cents per gallon. Confirmation could not be definitely obtained, but usually reliable reports were that the low-priced motor fuel originated in Mexico.

In contrast to the week's developments in the gasoline market, and despite the near end of the burning season, light fuel oils moved higher in this territory. Socony-Vacuum Oil Co., Inc., raised kerosene and No. 2 fuel oil in New York and New England points, excepting western New York State, about a third of a cent per gallon. Details of the increase at other points were not available, but in New York City the tank-car market for kerosene was increased to 5.9 and No. 2 fuel oil to 5.6 cents per gallon.

The present quotations by Socony-Vacuum, however, are still on the short side of the kerosene and No. 2 fuel-oil market range. Some suppliers are quoting up to 6.5 cents per gallon for kerosene, but, obviously, with little desire to take on new accounts.

A check of the motor-fuel market in New York indicated that a majority of current spot tank-car business is moving at the level of 6.5 to 6.75 cents per gallon. Market observers are unable to judge with any degree of accuracy whether the current market can be maintained until consumption relieves the pressure or whether further concessions will be required to offset the less expensive material appearing in Brooklyn.

Weather conditions continue to function against the motor-fuel market in this territory. Temperatures remain subnormal for this season, and parts of the northeastern territory have not been free of snow for several weeks. Another light snowstorm March 22 interfered to some extent with the normal Easter traffic in the vicinity of New York and to a greater degree in the northern part of the state and in New England.

Buyers in this section of the country report kerosene and No. 2 fuel oil are increasingly difficult to locate on the Gulf and that spot delivery is practically out of the question. The weather conditions that have hampered early spring automobile driving have prolonged the burning season at levels almost equal to those prevailing in January and February. Refiners and terminal operators in this district admit that stocks are practically at an irreducible working level and that a prolonged, cold spring season will probably force another heavy call on imports to satisfy domestic requirements.

Kerosene is quoted on the Gulf Coast at a range of 4.5 to 4.75 cents per gallon, but several prospective purchasers said that outstanding offers of 4⅝ cents per gallon had failed to attract commitments from refiners. The truth of the matter is that most Gulf Coast refiners are not in position to make delivery on kerosene or light fuel oil for at least 30 to 45 days.

Receipt of several recent inquiries for motor fuel by Gulf Coast refiners indicates that interest in this market for spring and summer demand is beginning to develop. However, it was impossible to determine from the nature of the inquiries whether they originated from a sincere buying interest, or possibly for a test of the market. There have been no spot cargo sales of motor fuel reported during the past few days and the published prices on the Gulf are largely the opinions of sellers. Belief persists among northeastern buyers that present prices can be shaded on a firm offer, but apparently there is a desire to wait for the lowest point of the market trough before business is actually placed.

Leaded gasoline meeting 72-74-octane specifications is available in quantity at a price range of 5¼ to 6¼ cents per gallon on the Gulf, while 70-octane motor fuel, unleaded, can be purchased at a range of 5¾ to 6¼ cents in several directions. A seller was reported to have offered a quantity of 72-74 leaded gasoline at 5 cents without attracting purchasers, but an investigation among buyers in New York indicated that the offer had been confined to limited quarters.

The Middle Atlantic district is also feeling the depressing effect of heavy motor-fuel stocks. Standard Oil Co. of Louisiana lowered regular gasoline to the dealer tank-wagon trade a cent per gallon at Nashville, Tenn., on March 16. The company increased kerosene to the tank-wagon trade at Knoxville and Nashville a half cent on March 18. Kerosene was reduced a cent at Bristol, Tenn.

There has been no activity whatever in the export market for motor fuel, and other refined products, as well as crude, have been as little sought. The first quarter of the year is drawing to conclusion with a substantial decline in export shipments from this country, probably averaging about 10 per cent below the similar period last year. Concentration of tankers in convoy systems and in services where supplies are available without the need for parting with needed strong currency is one of the factors accounting for the slump in exports. Civil consumption in the belligerent nations is held to a minimum and the blockade of ocean commerce with neutrals is hampering a market that might otherwise be more vigorous.

Lubricating-oil stocks in the western Pennsylvania refining district continued unsteady, but evidence was filtering into the market that buying activity in the lubricating stocks for summer demand would develop within the next 2 or 3 weeks. There is nothing tangible which can be construed as a sign of revival of the export market. The British withdrawal of navicerts for lubricating-oil shipments to Holland and other neutral countries in western Europe is interfering with shipments which were moving out at regular intervals through the end of January. There is no indication when the British blockade will be modified with respect to lubricating-oil shipments.

A. P. I. Weekly Refinery Statistics

Week Ended March 23, 1940

	Capacity reporting (per cent)	Daily crude runs (bbl.)	Total gasoline stocks (bbl.)	Gas oil and distillate stocks (bbl.)	Residual fuel-oil stocks (bbl.)
East Coast	100.0	592,000	21,135,000	5,942,000	7,905,000
Appalachian	87.3	133,000	3,959,000	380,000	665,000
Ind., Ill., and Ky.	90.7	563,000	18,013,000	2,403,000	3,027,000
Okla., Kans., and Mo.	81.6	270,000	8,949,000	1,056,000	1,954,000
Inland Texas	50.3	115,000	2,011,000	266,000	1,401,000
Texas Gulf	90.0	810,000	16,472,000	2,575,000	5,428,000
Louisiana Gulf	97.8	120,000	3,090,000	617,000	869,000
North Louisiana and Ark.	55.0	41,000	692,000	204,000	444,000
Rocky Mountains	54.2	54,000	1,783,000	150,000	547,000
California	90.0	510,000	18,154,000	9,062,000	78,563,000
Total reported	86.4	3,208,000	94,258,000	22,655,000	100,803,000
Est. unreported	.....	352,000	7,040,000	620,000	1,995,000
*Est. total	.....	3,560,000	101,298,000	23,275,000	102,798,000
*Est. total previous wk.	.....	3,500,000	100,616,000	24,075,000	103,558,000
*Mar. 24, 1939	.....	3,225,000	86,648,000	26,720,000	109,993,000

*Bureau of Mines.

Stocks of Crude Oil in the United States

(BUREAU OF MINES ESTIMATE)

Week ended March 16, 1940	246,762,000 barrels
Week ended March 9, 1940	245,762,000 barrels
Week ended March 18, 1939	273,345,000 barrels

Figures do not include stocks of heavy, unrefinable California crude.

Gulf Coast Markets

HOUSTON, Tex., Mar. 26.—The extreme tightness in fuel and burning oils existing in the Gulf Coast markets for the past several weeks showed signs of easing up. Bunker C in cargoes was quoted at 85 to 90 cents, while Bunker C fuel in

(Continued on Page 248)

Retail Oil Markets

Tank-wagon and filling station prices on gasoline and kerosene furnished by the larger marketing firms

Prices as of March 26, 1940

Taxes

The gasoline quotations given in the following tables include the 1-cent federal tax, as well as state, county, and city taxes. The gasoline is the regular or standard grade. In most areas lower grades and a premium grade also are available.

Standard Oil Co. (Indiana)

	Gasoline			Kero.
	Tank wag.	Dir.	Incl. tax	tank wag.
Chicago, Ill.	15.1	13.1	4.0	10.0
Decatur	15.1	12.1	4.0	9.5
Joliet	15.1	13.6	4.0	10.0
Peoria	15.1	12.7	4.0	10.0
Quincy	14.9	13.4	4.0	9.8
Davenport, Ia.	15.1	13.6	4.0	‡10.0
Des Moines	14.9	12.4	4.0	‡9.8
Mason City	15.3	13.8	4.0	‡10.2
Duluth, Minn.	16.9	15.4	5.0	10.8
Mankato	16.5	15.0	5.0	10.4
Minneapolis	16.5	14.5	5.0	10.4
LaCrosse, Wis.	16.5	15.0	5.0	10.4
Green Bay	16.9	15.4	5.0	10.3
Milwaukee	16.3	14.8	5.0	10.2
Detroit, Mich.	13.6	12.1	4.0	7.6
Grand Rapids	13.2	11.7	4.0	9.0
Saginaw	14.8	13.3	4.0	9.3
Evansville, Ind.	16.6	15.1	5.0	†10.5
Indianapolis	16.8	14.3	5.0	†10.2
South Bend	16.8	15.3	5.0	†10.2
Fargo, N. D.	17.7	16.2	5.0	11.6
Huron, S. D.	17.0	15.5	5.0	10.9
Kans. City, Mo.*	14.4	12.9	4.0	8.0
St. Louis*	14.7	13.2	4.0	8.0
St. Joseph	14.4	12.0	4.0	7.9
Wichita, Kans.	13.3	11.1	4.0	7.0

*State tax 2 cents, 1-cent city tax, and 1-cent federal tax. †Does not include 4-cent state tax. ‡Does not include 3-cent state tax.

Exclusive of state general sales taxes.

Discounts to commercial consumers: On purchases per month off tank-wagon prices: 1,000 gal. or more, 1.5 cents off; minimum delivery 25 gal.

Stanolex Fuel Oil in Chicago

Effective February 15, 1940, f.o.b. Chicago tank-wagon prices: Standard heater oil, 1-99 gal., 9 cents; 100-149 gal., 8 cents; 150 gal. and over, 7.5 cents. Stanolex fuel oil No. 1, 1-149 gal., 9.5 cents; 150-399 gal., 7.5 cents; 400 gal. and over, 7 cents. Stanolex furnace oil, 1-149 gal., 8.5 cents; 150-399 gal., 7.5 cents; 400 gal. and over, 7.5 cents. Stanolex Grade A, 1-399 gal., 5.5 cents; 400 gal. and over, 4.5 cents. Stanolex Grade B, 1-799 gal., 5.25 cents; 800 gal. and over, 4.25 cents. Stanolex Grade C, 1-999 gal., 4.5 cents; 1,000 gal. and over, 3.5 cents.

Ohio

STANDARD OIL CO. OF OHIO

	Gasoline			Kero.
	Cons'r tank wag.	Divided dlr.	Incl. tax	tank wag.
Ohio points	15.5	14.5	5.0	*13.0

*Includes state tax of 1 cent.

Atlantic Coast District

STANDARD OIL CO. OF NEW JERSEY

	Gasoline			Kero.
	Cons'r tank car	Dir. tank wag.	Incl. tax	tank wag.
Atl'tic City, N. J.	11.6	12.7	4.0	8.1
Newark	11.6	12.7	4.0	8.1
Annapolis, Md.	13.35	14.35	5.0	9.5
Baltimore	12.75	13.75	5.0	7.5
Cumberland	14.15	16.15	5.0	10.0
Wash'gton, D. C.	11.00	12.0	3.0	9.5
Danville, Va.	14.95	17.45	6.0	11.5
Norfolk	13.75	16.25	6.0	11.0
Petersburg	14.05	16.55	6.0	11.7
Richmond	14.05	16.55	6.0	11.0
Roanoke	15.25	17.75	6.0	11.5
Charles'n, W. Va.	14.55	17.05	6.0	12.6
Parkersburg	13.85	15.35	6.0	11.2
Wheeling	14.85	16.75	6.0	11.8
Charlotte, N. C.	16.90	18.40	7.0	11.8
Hickory	17.45	18.95	7.0	12.3
Mt. Airy	17.30	18.80	7.0	12.2
Raleigh	16.65	18.15	7.0	11.5
Salisbury	16.95	18.45	7.0	11.9
Charleston, S. C.	14.75	17.25	7.0	9.25
Columbia	15.60	18.10	7.0	11.5
Spartanburg	16.30	18.80	7.0	12.2

Price basis to Essolene undivided dealers: Dealer tank-wagon price less 0.5 cent per gallon. Price basis to commercial consumers, effective March 8, 1937, in Maryand, District of Columbia, and in Arlington and Fairfax counties in Virginia; and March 12 in New Jersey: To contract accounts purchasing at least one full compartment at time by hose connection, on yearly purchases: From 2,500 to 100,000 gal., consumer tank-wagon price at time and place of delivery; 100,000 gal. per year, consumer tank-car price plus 0.5 cent per gallon. Consumer tank-wagon price generally will be equivalent to dealer tank-wagon price less 0.5 cent per gallon.

Effective January 16, 1939, in North Carolina the commercial consumer schedule became as follows: Single deliveries of 50 gal. or more, consumer tank-wagon price. Single deliveries of less than 50 gal., 4 cents per gallon over consumer tank-wagon price. Generally the posted consumer tank-wagon price will be equivalent to the dealer price, less 0.5 cent per gallon. The above policy also applies in South Carolina, effective January 23, 1939.

Discounts for kerosene, 1 cent off tank-wagon price for 25 gal. or more under contract (contract not necessary in Baltimore), except no discount in New Jersey.

Southern District

STANDARD OIL CO. (KENTUCKY)

	Gasoline			Kero.
	Cons'r tank wag.	Net dlr.	Incl. tax	tank wag.
Atlanta, Ga.	18.0	18.0	7.0	10.0
Augusta	17.5	17.5	7.0	10.0
Macon	18.0	18.0	7.0	10.0
Savannah	16.5	16.5	7.0	9.0
Birmingham, Ala.	18.5	18.5	9.0	9.0
Mobile	18.5	18.5	9.0	9.0
Montgomery	19.5	19.5	9.0	11.0
Jackson, Miss.	16.0	16.0	7.0	10.0
Vicksburg	16.5	16.5	7.0	9.5
Jacksonville, Fla.	17.0	17.0	8.0	8.0
Miami	17.0	17.0	8.0	8.0
Pensacola	18.5	18.5	9.0	8.5
*Tampa	21.0	18.0	8.0	8.0
Lexington, Ky.	16.5	16.5	6.0	10.0
Covington	14.5	14.5	6.0	9.5
Louisville	15.5	15.5	6.0	9.0
Paducah	15.5	15.5	6.0	9.0

Price basis to tank-wagon consumers, effective January 4, 1937, 3 cents per gallon below tank-wagon price.

Montgomery, Ala., has a county tax of 1 cent per gallon, and a city tax of 1 cent per gallon on gasoline, in addition to state tax and 1 cent per gallon on kerosene. Mobile, Ala., has a city gasoline tax of 2 cents per gallon; Birmingham, Ala., has a city gasoline tax of 1 cent per gallon; Pensacola, Fla., has a city gasoline tax of 1 cent. All are included in the table.

*Temporary discounts to tank-wagon consumers in Tampa 3 cents per gallon below consumer tank-wagon price on Crown gasoline.

New York and New England

SOCONY-VACUUM OIL CO., INC.

	Gasoline			Kero.
	Cons'r tank car	Dir. tank wag.	Incl. tax	tank wag.
Albany	12.1	14.1	5.0	8.3
*Met. N. Y.: Manhat., Bronx, Queens, Brklyn., Staten Island	12.2	13.3	5.0	8.5
Buffalo	12.6	14.5	5.0	7.9
Rochester	12.8	14.8	5.0	8.5
Syracuse	12.7	14.5	5.0	8.8
Portland, Me.	12.1	14.1	5.0	8.5
Manchester, N.H.	12.7	14.5	5.0	8.9
Burlington, Vt.	12.6	14.9	5.0	8.7
Boston, Mass.	11.0	12.5	4.0	8.5
Worcester	11.6	13.1	4.0	8.0
Hartford, Conn.	11.4	13.3	4.0	8.4
New Haven	11.3	12.3	4.0	7.5
Providence, R. I.	11.0	13.0	4.0	8.5

*Does not include 2 per cent city sales tax, which is calculated on basis of net retail price exclusive of state and federal taxes. Metropolitan New York prices are undivided dealer prices; others are split dealer.

Effective February 15, 1939, the company changed its commercial consumer policy in New York and in New England points for tank-wagon delivery to the following: Annual purchases 10,000 gal. and under, tank-car price plus 2 cents per gallon; annual purchases 10,000 gal. up to 50,000 gal., tank-car price plus 1.5 cents per gallon; annual purchases 50,000 to 200,000 gal., tank-car price plus 1 cent per gallon; annual purchases 200,000 gal. and over, tank-car price plus ½ cent per gallon. Private consumers pay undivided dealer price, plus 2 cents per gallon. Private consumers receiving full compartment deliveries of at least 200 gal. receive a discount of ½ cent per gallon.

Pennsylvania and Delaware

ATLANTIC REFINING CO.

	Gasoline			Kero.
	Cons'r tank car	Dir. tank wag.	Incl. tax	tank wag.
Philadelphia, Pa.	12.0	12.8	5.0	10.5
Pittsburgh	13.0	14.5	5.0	10.5
Allentown	13.0	14.5	5.0	10.5
Erie	13.0	14.5	5.0	10.0
Scranton*	12.5	15.0	5.0	10.5
Altoona	13.0	15.0	5.0	10.5
Dover, Del.	...	13.5	5.0	10.5
Wilmington	...	13.5	5.0	10.0

Price basis to undivided dealers, dealer tank-wagon price less 0.5 cent per gallon.

Discount on kerosene, 2 cents per gallon off tank-wagon price on tank-wagon deliveries of 25 gal. or more at one time.

*Voluntary discount of 1 cent allowed to dealers only.

Pacific Coast Territory

STANDARD OIL CO. OF CALIFORNIA

	Gasoline			Kero.
	Tank truck	Serv. sta.	Incl. tax	tank wag.
San Francisco	17.5	18.5	4.0	11.5
Los Angeles	17.0	18.0	4.0	10.0
Fresno, Calif.	18.5	19.5	4.0	12.5
Phoenix, Ariz.	20.0	21.0	6.0	*17.5
Reno, Nev.	20.5	21.5	5.0	13.5
Portland, Ore.	20.0	21.0	6.0	13.5
Seattle, Wash.	20.0	21.0	6.0	†13.75
Spokane	21.5	22.5	6.0	†16.75
Tacoma	20.0	21.0	6.0	†13.75

*Includes 5-cent state tax. †Includes 0.25-cent state tax.

Discounts to dealers: On gasoline, off tank-wagon price, to 100 per cent dealers, 3 cents. To commercial consumers: On tank-wagon price; on single deliveries of 40 gal. and over, advance quantity discount extended at time of delivery, 3 cents. Service-station schedule applies on single deliveries less than 40 gal. On kerosene in tank-car, transport-truck, and trailer delivery, 3 cents off tank-wagon price; plant deliveries to jobbers, 2.5 cents below tank wagon.

March 18, 1939, split dealer discount was canceled.

Rocky Mountain District

CONTINENTAL OIL CO.

	Gasoline			Kero.
	Tank wag.	Dir.	Incl. tax	tank wag.
Denver, Colo.	13.0	...	5.0	10.5
Grand Junction	17.5	...	5.0	12.5
Pueblo	13.0	...	5.0	9.0
Casper, Wyo.	16.5	...	5.0	11.5
Cheyenne	15.5	...	5.0	11.0
Billings, Mont.	18.0	...	6.0	12.0
Butte	19.0	...	6.0	13.0
Great Falls	18.0	...	6.0	12.0
Helena	18.5	...	6.0	12.5
Salt Lake, Utah	15.5	15.5	5.0	14.0
Boise, Idaho	21.1	21.1	6.0	16.0
Twin Falls	21.1	21.1	6.0	16.5
Albu'que, N. M.	13.5	...	6.5	10.0
Roswell	16.0	16.0	6.5	8.0
Santa Fe	17.5	17.5	6.5	10.0

*Includes city tax of 0.5 cent. †Includes state tax of 1 mill.

Tank wagon represents price to consumers. Dealer represents price to dealers. If no dealer price is quoted, the tank-wagon price applies to all classes of trade.

Central South District

STANDARD OIL CO. OF LOUISIANA

	Gasoline			Kero.
	Cons'r tank car	Dir. tank wag.	Incl. tax	tank wag.
New Orleans, La.	14.75	17.25	8.0	‡11.0
Baton Rouge	14.75	17.25	8.0	‡10.5
Alexandria	14.75	17.25	8.0	‡10.5
Lafayette	15.00	17.50	8.0	‡10.0
Lake Charles	14.75	17.25	8.0	‡12.5
Shreveport	13.50	16.00	8.0	9.0
Knoxville, Tenn.	18.00	20.50	8.0	12.5
Memphis	16.00	18.50	8.0	11.0
Chattanooga	17.50	20.00	8.0	12.0
Nashville	17.00	18.50	8.0	11.5
Bristol	18.25	17.75	8.0	12.0

Essolene at dealer price less 0.5 cent per gallon to undivided dealers.

†Includes 1-cent parish tax and 1-cent state tax. ‡Includes 1-cent state tax.

Price basis to commercial consumers: Effective May 15, 1937, deliveries of 50 gal. or more in one territory take posted consumer tank-wagon price. Accounts taking deliveries of less than 50 gal. at one time pay posted consumer tank-wagon price plus 4 cents per gallon. Generally, the posted consumer tank-wagon price will be equivalent to the dealer price less 0.5 cent per gallon. Kerosene prices include 1-cent state tax.

Effective February 24, 1939, the company reestablished in New Orleans the commercial consumer policy on motor fuel effective in the rest of the state.

Effective December 12, 1938, the company revised its commercial consumer policy on motor fuel in New Orleans, as follows: Single deliveries of less than 50 gal., consumer tank car plus 2 cents per gallon 50 to 199 gal., consumer tank car plus 1 cent per gallon; 200 gal. and over, consumer tank car plus 0.5 cent per gallon.

Oklahoma and Arkansas

CONTINENTAL OIL CO.

	Gasoline			Kero.
	Tank wag.	Dir.	Incl. tax	tank wag.
Texarkana, Ark.	13.0	...	5.0	7.0
Fort Smith	14.5	...	5.0	7.5
Little Rock	16.75	...	7.5	8.0
Muskogee, Okla.	13.0	12.0	5.0	7.0
Oklahoma City	11.0	...	5.0	6.5
Tulsa	11.0	...	5.0	6.0

Tank wagon represents price to consumers. Dealer represents price to dealers. If no dealer price is quoted, the tank-wagon price applies to all classes of trade.

Nebraska

STANDARD OIL CO. OF NEBRASKA

	Gasoline			Kero.
	Tank wag.	Dir.	Incl. tax	tank wag.
Omaha	16.5	13.5	6.0	9.5
McCook	16.5	13.9	6.0	9.0
Norfolk	16.5	14.4	6.0	9.5
North Platte	17.8	14.9	6.0	10.0
Scottsbluff	18.5	15.5	6.0	10.0

Discounts to commercial consumers for tank-wagon deliveries covered only by standard commercial consumers contract, effective January 1, 1935.

Texas

	Gasoline			Kero
	Tank wag.	Dir.	Incl. tax	tank wag
Dallas, Tex.	12.0	16.0	5.0	7.0
Fort Worth	12.0	16.0	5.0	8.0
Houston	13.5	17.5	5.0	7.0
San Antonio	13.0	17.5	5.0	8.0

Naphtha

STANDARD OIL CO. (INDIANA)

	Tank wagon*
Oleum spirits	16.2
V.M.&P. naphtha	16.5
Cleaners' naphtha	15.5
Stanisol	15.5

*Prices include 3-cent Illinois tax but not 1-cent federal tax nor 2 per cent retail occupational tax.

Prices f.o.b. Chicago. Each price subject to discount of 1 cent per gallon for 150-gal. lots if covered by contract.

Tank-Wagon Changes

Standard Oil Co. of Louisiana January 17 advanced dealer tank-wagon gasoline 2 cents in Nashville; March 16, reduced it 1 cent. March 18, advanced tank-wagon kerosene 0.5 cent in Knoxville and Nashville; on same date reduced tank-wagon kerosene 1 cent in Bristol.

Socony-Vacuum Oil Co., Inc., March 19 reduced consumer tank-car gasoline 0.5 cent in Buffalo and Rochester and dealer tank-wagon gasoline 0.2 cent in Rochester; March 14, reduced dealer tank-wagon gasoline 0.5 cent in Boston and Burlington.

Gulf Coast Markets

(Continued from Page 247)

bunkers continued to be quoted at 90 to 95 cents. Sellers still found it difficult to move material due to the continued high tanker rates.

Kerosene continued its strong position. The supply was still reported exhausted and buyers continued to beg for material. No change was reported in the price, which is 4¾ cents or better.

There was no change in the gasoline situation. No new business was reported and quotations on material generally were withheld by sellers.

Prices of Refined Products

All quotations f.o.b. plant in cars for interstate or export movement except as otherwise noted

Prices as of March 26, 1940

The following quotations are exclusive of the federal excise taxes of 1 cent a gallon on gasoline and 4 cents a gallon on lubricating oils.

Refinery Gasoline

OKLAHOMA (Group 3)—		
U. S. Motor grades:		
62 octane and below	.03½	.03⅝
63-66 octane	.03¾	.03⅞
67-69 octane	.04	.04⅛
70-72 octane (regular)	.04⅜	.04½
60-62 400 grades:		
62 octane and below	.03⅜	.03⅜
63-66 octane	.03⅞	.04
67-69 octane	.04⅛	.04⅛
70-72 octane (regular)	.04⅜	.04½
68-70 360	.04½	.04⅝
NORTH TEXAS—		
U. S. Motor grades:		
62 octane and below	.03½	.03⅝
63-66 octane	.03¾	.03⅞
67-69 octane	.04	.04⅛
70-72 octane (regular)	.04⅜	.04½
60-62 400	.03⅜	.03⅜
NORTH LOUISIANA (Ark. and N. La. delivery)—		
U. S. Motor grades:		
62 octane and below	.04⅛	.04¼
63-66 octane	.04⅜	.04½
70-72 octane (regular)	.04⅞	.05
ARKANSAS (Ark. and N. La. del.)—		
U. S. Motor grades:		
62 octane and below		.04
70-72 octane (regular)		.05
CHICAGO (Based on Group 3)—		
U. S. Motor grades:		
62 octane and below	.03¾	.04
63-66 octane	.04	.04¼
67-69 octane	.04¼	.04½
70-72 octane (regular)	.04½	.04¾
60-62 400 grades:		
62 octane and below	.03¾	.04
63-66 octane	.04	.04¼
67-69 octane	.04¼	.04½
70-72 octane (regular)	.04½	.04¾
68-70 360	.04¾	.04⅞
PENNSYLVANIA (Inland refineries)—		
58-62 U. S. Motor		.05
72-74 octane (regular)	.06	.06¼
CALIFORNIA (domestic movement)—		
54-58 U. S. Motor	.05¾	.07
58-60 400, 65 oct. and higher	.07	.08
EAST COAST (domestic)—		
U. S. Motor, 65 and above:		
*New York (Bayonne)	.06¼	.07½
Philadelphia	.06¼	.07½
Boston	.06½	.07½
Baltimore	.06¼	.07¾
Charleston, S. C.	.07	.07¾

*All grades of gasoline ⅛ to ¼ cent less for barge shipments. New York harbor prices are for New York and New England delivery. Prices for New Jersey delivery ¼ cent lower.

GULF COAST (domestic)—		
U. S. Motor grades:		
65-67 octane	.04⅝	.04⅝
68-70 octane	.04¾	.05
70-72 octane (leaded)	.05	.05⅛

Natural Gasoline

OKLAHOMA (Group 3)—		
Grade 26-70		.01½
Grade 18-55	.01¾	.01⅞
NORTH TEXAS—		
Grade 26-70		.01½
Grade 18-55		.01½
CALIFORNIA—		
75-85 375-390	.05¾	.06
NORTH LOUISIANA (Ark. and N. La. delivery)—		
Grade 26-70		.01⅝

Tractor Fuel

OKLAHOMA (Group 3)—		
40-42 gr., 315-325 l.b.p., 110-flash, 540-550 e.p.	.03¾	.03⅞
41-43 gr., 300-320 l.b.p., 110-125 flash, 500-520 e.p.	.03¾	.03⅞
46-48 gr., 210-230 l.b.p., 480-max. e.p.		.04⅛

Kerosene

(All kerosene water white)

OKLAHOMA (Group 3)—		
41-43		.03⅞
42-44		.04
NORTH TEXAS—		
41-43	.03¾	.03⅞
NORTH LOUISIANA (Ark. and N. La. delivery)—		
41-43		.03⅞
ARKANSAS (Ark. and N. La. del.)—		
41-43		.03⅞
PENNSYLVANIA (Inland refineries)—		
45	.05	.05⅛
46		.05⅛
47		.05¼
CHICAGO (Based on Group 3)—		
41-43	.03⅞	.04
42-44	.04	.04⅛
CALIFORNIA (Pac. Coast market)—		
38-43 high burning test	.04½	.05⅝
NEW YORK (Bayonne, N. J.)—		
41-43	.059	.065
***GULF COAST (domestic)—**		
41-43	.04½	.04⅝

*Barge price ⅛ cent lower.

Furnace Oil

OKLAHOMA (Group 3)—		
Range oil	.03¾	.03⅞
No. 1 prime white, 38-42	.03⅝	.03¾
No. 1 straw, 38-40	.03½	.03⅝
No. 2 straw, 32-36	.03⅜	.03½
No. 2 dark, 32-36	.03¼	.03⅜
No. 3 zero to 10, 28-32		.03¼
No. 3, 15 and above, 28-32	.02¾	.02⅞
NORTH TEXAS—		
No. 1 prime white, 38-42	.03¾	.03⅞
No. 1 straw, 38-40	.03⅜	.03¾
NORTH LOUISIANA (Ark. and N. La. delivery)—		
No. 2, 32-36	.03	.03¼
ARKANSAS (Ark. and N. La. del.)—		
No. 2, 32-36		.03⅜
CHICAGO (Based on Group 3)—		
Range oil	.03¾	.03⅞
No. 1 prime white, 38-40	.03⅝	.03⅞
No. 1 straw, 38-40	.03½	.03¾
No. 2 straw, 32-36	.03⅜	.03½
No. 2 dark, 32-36	.03¼	.03⅜
No. 3, zero to 15, 28-32	.03¼	.03⅜
No. 3, 15 and above, 28-32	.02¾	.02⅞
NEW YORK (Bayonne, N. J.)—		
*No. 1	.059	.065
*No. 2	.051	.056
*No. 4	.051	.06

*Barge deliveries ⅛ to ¼ cent under above tank-car price.

Gas Oil and Fuel Oil

(Gas oil per gal., fuel oil per bbl.)

OKLAHOMA (Group 3)—		
U.G.I. gas oil, under 35	.02⅝	.02⅝
No. 5, low pour point, 18-22	.72½	.77½
No. 6, 15 and above, 8-14	.45	.50
NORTH TEXAS—		
U.G.I. gas oil, under 35	.02⅝	.02⅝
No. 5, low pour point, 18-22	.72½	.77½
No. 6, 15 and above, 8-14	.45	.50
NORTH LOUISIANA (Ark. and N. La. delivery)—		
10-14 fuel oil, industrial	.70	.75
CHICAGO (Based on Group 3)—		
U.G.I. gas oil	.02⅝	.02⅞
No. 5, low pour point, 18-22	.75	.80
No. 5, 15 and above, 18-22	.60	.70
No. 6, low pour point, 10-16	.60	.70
No. 6, 15 and above, 10-16	.45	.55
PENNSYLVANIA (Inland refineries)—		
36-40	.03¾	.04
CALIFORNIA—		
Los Angeles:		
30-40 gas oil, per bbl.	1.15	1.25
24 plus diesel, per bbl.	1.15	1.25
24 plus diesel (bunkers)	1.20	1.35
12-16 (bunkers at tidewater)	.65	.75
10-16 (cargo lots)	.65	.75
12-17 (tank cars)	.60	.75
10-17 (high sulfur)	.50	.65
San Joaquin Valley:		
10-18 (tank cars)	.50	.70
24 plus diesel, per bbl.	1.15	1.25
San Francisco:		
24 plus diesel, per bbl.	1.35	1.40
24 plus diesel (bunkers)	1.40	1.50
10-16 (bunkers)	.80	.85
GULF COAST—		
No. 2 fuel		.04¼
43-47 diesel		.04
48-52 diesel		.04¼
53-57 diesel		.04½
58-and-above diesel		.04¾
Bunker C (bulk cargoes)	.85	1.00
Bunker C (bunkers)	.90	.95
NEW YORK (Bayonne, N. J.)—		
27 plus, gas oil	.051	.056
28-30 diesel (lighterage 6¼c per bbl.)	2.10	2.20
28-30 diesel (tank cars)	.05	.056
Bunker C (to ocean-going ships in N. Y. Harbor)		1.50
Industrial fuel (tank cars)	.035	.04

Lighterage charge 5c bbl. additional.

Bright and Steam Refined

OKLAHOMA (Group 3)—		
200-210 D, 10-25		.26
150-160 D, 0-10		.22
150-160 D, 10-25		.21
100-110 D, 0-10		.21
100-110 D, 10-25		.20
Steam refined:		
600 dark green (untreated)		.07½
PENNSYLVANIA—		
Bright Stocks (Pennsylvania Grade No. 8 color, 140-150 at 210, 545-550 flash):		
10 pour point		.26
15 pour point		.25
25 pour point	.23½	.24
Steam refined:		
600	.13	.14
650	.15	.16
600 flash	.17	.18
630 flash	.19	.20

Neutral Oil

(Vis. at 100° F. except Pennsylvania and color N.G.A.)

OKLAHOMA (Group 3)—		
0-10 pour point:		
150-3		.11½
180-3		.12½
180-4		.12
200-3		.13
200-4		.12½
250-3		.14½
250-4		.14
280-3		.15½
280-4		.15
300-3½		.16
400-3½		.17
100-2½ paraffin oil		.07
10-25 pour point:		
200-3		.12½
200-4		.12
250-3		.14
250-4		.13½
280-3		.15
280-4		.14½
GULF COAST—		
Pale oils:		
200-3	.07¼	.07½
300-3	.07¾	.08
500-3½	.08½	.09
750-3½	.09	.09½
1,200-3½	.09¾	.10
2,000-4		.10¼
Red oils:		
200-5-6	.07	.07¼
300-5-6	.07½	.07¾
500-5-6	.08¼	.08¾
750	.08¾	.09¼
1,200-5-6	.09⅝	.09⅝
CALIFORNIA (moving to dom. market)—		
Pale oils:		
100-2½-3	.07¼	.08
200-2½-3	.07¼	.08
300-2½-3	.07¼	.08
400-3-4	.07¼	.08
450-3-4	.07¼	.08
550-3-4	.09	.11
600-3-4	.09	.11
Red oils:		
200-4-5	.07¼	.08
300-5-6	.07¼	.08
350-5-6	.09¼	.11½
400-5-6	.09¼	.11½
450-5-6	.09¼	.11½
500-5-6	.09¼	.11½
600-5-6½	.09¼	.11½
700-6½ plus	.09¼	.11½
750-6½ plus	.09¼	.11½
900-6½ plus	.09¼	.11½
PENNSYLVANIA—		
150 vis. at 70° F., 3 color, 400-405 flash		
Zero pour point		.27½
10 pour point		.26½
15 pour point		.25½
25 pour point		.24
200 vis. at 70° F., 3 color:		
Zero pour point		.29½
10 pour point		.28½
15 pour point		.27½
25 pour point		.26

Wax and Petrolatum

(Prices per pound)

OKLAHOMA (Group 3)—		
124-126 (A.m.p.) w.c. scale		.05½
PENNSYLVANIA (Inland refineries)—		
122-124 (A.m.p.) w.c. scale	.05½	.05¼
124-126 (A.m.p.) w.c. scale	.05½	.05¼
NEW YORK—		
Wax in bags fully refined:		
125-127 (A.m.p.) wax	.062	.063
128-130 (A.m.p.) wax	.061	.064
130-132 (A.m.p.) wax	.061	.064
133-135 (A.m.p.) wax	.065	.066
135-137 (A.m.p.) wax	.0665	.0685
Crude scale:		
124-126 (A.m.p.) w.s.	.0525	.0550
124-126 (A.m.p.) y.s.	.0525	.0550
Petrolatum in barrels, carload lots:		
Dark green	.03125	.03375
Amber	.03375	.03625
Extra amber	.03625	.03875
Lily white	.05875	.06000
Snow white	.06875	.07000
Cream	.04875	.05000

Export Prices

GASOLINE

GULF COAST—		
U. S. Motor	.05	.05⅝
60-62 400	.05¼	.06¼
61-63 390	.05¼	.06¼
64-66 375	.05⅝	.06¼
LOS ANGELES—		
U. S. Motor grades:		
60-65 octane	.05½	.05⅝
65-69 octane	.05⅝	.06¼
Above 69 octane	.06¼	.06¼

KEROSENE

GULF COAST—		
41-43 water white	.04¾	.05¼
LOS ANGELES—		
41-43 water white	.05	.05¼

LUBRICANTS

(Pennsylvania Grade)

NEW YORK (f.o.s. in bbl.)—		
Cylinder stocks:		
600 S.R. unfiltered	.22½	.23
630 S.R. unfiltered	.24	.25
600 flash, S.R.	.25½	.26
630 flash, S.R.	.29	.31
Bright stock:		
Light, 25 pour point	.32½	.34

NEUTRAL OIL

200-3 color	.35½	.36
150-3 color	.34	.36

PARAFFIN WAX

NEW YORK (prices per pound)—		
123-125 A.m.p.	.07000	.07125
125-127 A.m.p.	.07125	.07250
128-130 A.m.p.	.07250	.07500
133-135 A.m.p.	.08000	.08250
135-137 A.m.p.	.08500	.08750
Crude scale:		
124-126 w.s.	.0525	.0550
124-126 y.s.	.0525	.0550

Market Record of Active Oil Stocks

Compiled by Carl H. Pforzheimer & Co., 25 Broad Street, New York City, Member New York Stock Exchange and New York Curb Exchange

New York Stock Exchange

1940 High	1940 Low	Week ended Mar. 23 High	Low	Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1939	Com. sh. earn. 1938	1937	1939 High	1939 Low	1938 High	1938 Low
..	..	54	53	54	Amerada Corp.	788,675	N.P.	50cQ	1-31-40	$2.00	$2.07	$3.04	74½	50	78	55
23⅜	20½	22⅞	22⅝	22¾	Atlantic Refining	2,663,999	$25	25cQ	3-15-40	1.00	1.40	3.51	24¾	18⅛	27⅝	17¾
15¾	13¾	14½	14⅛	..	Barber Asphalt Co.	390,223	$10	25c	2-20-40	.25	—.85	1.91	21	10¼	23¾	12⅛
13⅜	10⅜	11¼	10⅞	10⅞	Barnsdall Oil Co.	2,250,344	$5	15c	3-9-40	.90	1.26	.85	19½	11⅛	21⅝	10½
8	7	7⅜	7⅛	7¼	Consolidated Oil Corp.	13,751,846	N.P.	20cQ	5-15-40	.80	.55	1.48	9⅞	6½	10⅜	7
25	22¼	22⅞	22¼	22½	Continental Oil of Delaware	4,682,581	$5	25cQ	3-25-40	1.00	1.10	2.98	31½	19⅞	35¾	21¼
6⅞	5½	5⅝	5½	5½	Houston Oil	1,098,618	$25	...	10-17-30	...	.83	.94	9⅝	4½	9⅝	5
13½	11⅜	12⅜	12⅜	12⅜	Lion Oil Refining	435,815	N.P.	25cQ	4-1-40	1.00	2.09	2.17	18⅛	10	25⅛	15⅝
15⅝	13⅞	14⅜	13⅜	13⅜	Mid-Continent Petroleum	1,857,912	$10	35c	12-1-39	.60	.56	2.86	18	11⅛	22⅝	12¼
10⅝	9½	9⅞	9½	9⅞	Mission Corporation	1,379,245	$10	40c	12-15-39	.65	1.04	1.31	14⅞	8⅜	17⅜	10⅝
9¾	8⅛	8⅝	8⅛	8⅝	National Supply	1,155,517	$10	....	12-22-37	....	—.79	4.90	15½	5⅝	23	12½
7⅝	6½	7⅝	7⅛	7¼	Ohio Oil Co.	6,563,377	N.P.	20c	12-15-38	....	.25	1.30	10⅜	6	14⅞	8⅜
8¼	7⅛	7⅛	7⅛	7⅛	Pacific Western Oil	1,000,000	N.P.	40c	12-19-39	.40	1.22	1.39	11⅞	7	15⅞	10¼
41¾	36½	39¼	38⅛	38⅜	Phillips Petroleum	4,449,052	N.P.	50cQ	3-1-40	2.00	2.03	5.42	46½	31⅛	44⅝	27¼
22⅜	20½	21¼	21	21⅛	Plymouth Oil Co.	1,006,200	$5	35cQ	3-30-40	‖1.40	2.59	2.85	24	17⅛	25⅝	15
9⅜	8⅛	9⅜	8⅜	8⅞	Pure Oil Co.	3,982,031	N.P.	25c	12-20-39	.25	.38	2.15	11⅜	6⅛	13½	8¼
8⅜	6¾	7½	6¾	7	Richfield Oil Corp.	4,010,000	N.P.	50c	12-18-39	.50	.51	.35	10¼	6⅝	9⅞	5
20	17¾	17⅞	17¾	17⅞	Seaboard Oil of Delaware	1,244,383	N.P.	25cQ	3-15-40	1.00	1.52	1.97	24⅜	15½	27½	15½
13⅛	10⅜	11½	10½	10⅝	Shell Union Oil	13,070,625	N.P.	25c	12-20-39	.50	.72	1.44	17¼	9⅜	18⅜	10
..	..	19⅛	18½	..	Skelly Oil	995,349	$15	25c	1-30-40	.75	2.27	6.07	29½	15½	34⅝	18½
12½	11⅛	11⅝	11⅛	11½	Socony-Vacuum	31,206,071	$15	25cSA	3-15-40	.50	1.29	1.82	15⅛	10¼	16⅜	10⅝
26⅛	22⅝	23⅛	22⅝	22⅞	Standard Oil of California	13,004,153	N.P.	25cQ	3-15-40	1.10	2.22	3.17	33⅝	24¼	34⅞	25⅛
27¾	25	26	25	25⅝	Standard Oil (Indiana)	15,272,020	$25	25c	3-15-40	1.25	1.82	3.66	30	22⅜	35½	24⅝
46½	42¾	44⅛	43¼	43⅜	Standard Oil of New Jersey	26,618,065	$25	75c‡	12-15-39	‖1.25	2.86	5.64	53½	38	58⅝	39⅜
63⅝	56¼	60⅜	60	60⅜	Sun Oil	2,316,484	N.P.	25c*	3-15-40	1.00	1.07	3.86	66	45⅜	65⅛	45
2½	2	2⅛	2	2	Superior Oil Corp.	1,388,979	$1	10c	12-28-38	....	.24	.32	3⅝	1⅜	4¼	1⅜
46⅞	42⅜	45½	44¼	45½	Texas Corp.	10,876,882	$25	50cQ	4-1-40	2.00	2.13	5.02	50⅜	32½	49⅝	32⅜
4⅛	3½	3¾	3⅝	3⅝	Texas Gulf Producing Co.	888,146	N.P.	10c	12-15-39	.20	.86	.68	5⅜	3¼	5⅞	2⅝
8⅝	7½	7⅞	7¾	7⅞	Texas Pacific Coal & Oil	888,236	$10	10c	3-1-40	.40	1.16	1.11	11⅜	7	12½	7
11⅛	10	10⅜	10⅛	10¼	Tide Water Associated	6,375,253	$10	15c	3-1-40	.80	1.28	2.08	14¼	9½	15⅝	10¼
17½	16	16¼	16	16¼	Union Oil Co. of California	4,666,270	$25	25c	3-10-40	1.05	1.47	2.58	19⅜	15⅛	22⅛	17⅛
27⅛	22¾	27¼	26⅞	26⅞	Union Tank Car Co.	1,177,381	N.P.	40c†	3-1-40	1.30	1.16	1.70	24¼	20½	23½	20
3⅝	3	3¼	3⅛	3	Wilcox Oil & Gas	487,568	$5	10c	2-15-40	....	.52	.24	4¼	2⅜	3½	1⅝

*Also 5 per cent in stock. †Includes extras. ‡Also 2 per cent in stock. §Also 4 per cent in stock. ‖Also 2½ per cent in stock. ¶Also 1⅛ per cent in stock. —Deficit.

New York Curb Exchange

1940 High	1940 Low	Week ended Mar. 23 High	Low	Close	Stocks—	Total shares outstanding	Par value	Latest dividend	Payable or last paid	Dividends paid in 1939	Com. sh. earn. 1938	1937	1939 High	1939 Low	1938 High	1938 Low
8⅞	6⅛	8⅞	8	8⅝	American Republics Corp.	1,308,049	$10	10c	7-11-38	....	—$0.22	$0.27	11⅜	5½	11⅜	5
3¼	2⅜	2⅜	2⅜	2⅜	Bridgeport Machine Co.	270,000	N.P.	$1.25	12-30-37	....	—.14	1.90	7¼	2½	10¼	4⅜
43	28	38¼	37½	37½	Buckeye Pipe Line Co.	200,000	$50	$1	3-15-40	$2.50	2.36	4.02	34⅝	26½	39	22½
116	110	110¾	110¾	110¾	Chesebrough Mfg. Co.	120,000	$25	$1.50Q†	3-29-40	6.00	5.32	6.73	130	108⅝	128	97
5⅛	4	4⅝	4½	4⅝	Cities Service (new)	3,704,067	$10	....	6-1-32	....	.23	1.02	9¼	4¼	11	5⅛
1½	1⅛	1⅜	1⅜	1⅜	Cosden Petroleum	462,551	$1	....	....	....	....	.19	2¼	½	2⅜	⅜
22⅜	19¾	21	20⅝	21	Creole Petroleum	6,975,383	$5	50cSA†	12-15-39	1.00	1.64	1.61	28	16¾	27½	17⅛
4⅜	4	4¼	4¼	4¼	Darby Petroleum	351,390	$5	25cSA	1-15-39	.25	....	1.36	7⅛	3⅝	10¼	5⅛
2	1⅝	1⅝	1⅝	1⅝	Derby Oil & Refining	263,162	N.P.	....	....	....	—.91	1.34	2⅜	1½	3½	1⅛
27	23½	27	27	27	Eureka Pipe Line	50,000	$50	50c	2-1-40	2.00	—.37	—.12	23	15½	31	16
39⅞	34	35½	34½	34⅞	Gulf Oil Corp.	9,076,202	$25	25cQ	4-1-40	1.00	1.43	3.51	45⅛	29¼	46⅞	33
68	58	60½	60	60	Humble Oil & Refining	8,987,840	N.P.	62½c	4-1-40	2.00	3.98	5.22	71	52½	72⅝	56
12⅜	11	11⅜	11	11¼	Imperial Oil of Canada	26,965,078	N.P.	37½c†	12-1-39	1.00	.96	.98	17	11⅜	19½	14⅛
7¾	5⅜	7¾	6½	7¾	Indiana Pipe Line	300,000	$10	20c	11-15-39	.50	.47	1.03	7¼	5½	9⅜	6
19¾	17	17½	17	17½	International Petroleum	14,324,088	N.P.	75c	12-1-39	1.75	1.98	....	27½	17	31¼	21
2¾	2¼	2⅜	2⅜	2⅜	Kirby Petroleum Co.	500,000	$1	10c	4-15-38	....	.14	.17	3¾	2⅛	5	2⅛
10⅜	9⅝	9⅞	9⅝	9¾	Lone Star Gas	5,553,747	N.P.	20c	4-22-40	.70	.88	1.14	10½	7⅛	10⅝	6⅝
6	5	5½	5	5½	Louisiana Land & Exp.	2,977,449	$1	10c	3-15-40	.35	.45	.58	7⅝	4	9⅜	6½
15	11½	..	..	..	Margay Oil Corp.	149,943	N.P.	25cQ	4-10-40	1.00	2.28	3.26	17	14½	24	16
8	7¼	7⅝	7⅝	7⅝	Midwest Oil Co.	998,474	$10	45c	12-15-39	.90	.93	1.14	8⅝	6⅝	9⅜	6⅝
5¾	5¼	5½	5⅝	..	Mountain Producers	1,593,584	$10	30cSA	12-15-39	90	.62	.76	6	4⅞	5⅜	4½
13⅛	12	12⅝	12½	12½	National Fuel Gas	3,810,183	N.P.	25cQ	4-15-40	1.00	.84	.96	14	11¼	14⅝	11⅛
11¼	8¾	11	10⅜	11	National Transit	509,000	$12.50	50c	12-15-39	.85	.88	1.19	9½	7¼	9¼	6½
1¼	1	1⅛	1⅛	1⅛	New Mexico and Arizona	1,000,000	$1	1c	12-1-37	....	.02	.02	1⅜	1	2⅝	1⅛
6½	5¼	6½	6½	6½	New York Transit	100,000	$5	25c	4-15-40	.40	.16	.49	6	4	4½	3⅛
7¾	6⅜	7½	7½	7½	Northern Pipe Line	120,000	$10	15c	12-1-39	.30	.24	.78	7	4½	6	4
5½	4⅝	5⅜	5½	5¼	Pantepec Oil	2,857,000	$1	....	....	....	....	....	7⅝	4	7⅝	3⅛
3¼	2¼	2¼	2¼	2¼	Root Petroleum Co.	336,045	$1	25c	2-1-37	....	.17	—.17	5	1¼	4½	1⅝
2¼	1⅞	..	..	..	Ryan Consolidated	298,931	N.P.	....	....	....	.29	.46	3	1⅞	4	2⅛
7⅜	4⅞	6¼	6¼	6¼	Southern Pipe Line	100,000	$10	15c	3-1-40	.30	—.27	.85	4⅞	3½	5⅜	3¼
44	37½	37⅜	37½	37⅜	South Penn Oil	1,000,000	$25	37½c	3-29-40	3.00	1.44	4.64	40½	26⅜	39	28⅜
35	22	..	..	..	Southwest Penna. Pipe Lines	35,000	$50	$5	4-1-40	2.00	—.41	.95	23	18	22¼	16½
20⅞	20	20⅜	20½	20⅝	Standard Oil of Kentucky	2,604,790	$10	25c	3-15-40	1.30	1.45	1.60	20½	17¼	18⅜	15
37½	28¾	34½	33¾	33¾	Standard Oil of Ohio	753,740	$25	25c	3-15-40	1.50	1.81	3.67	32¾	17	22⅜	16⅛
2	1¾	1⅞	1⅞	1⅞	Sunray Oil	2,007,076	$1	5c	5-1-40	.10	.23	.42	2⅜	1⅜	3¼	2
2¾	2½	2¾	..	..	Texon Oil & Land	936,024	$2	10c	3-29-40	.10	.56	.51	4	2⅝	5¼	3½
3⅜	2¼	2½	1⅛	2⅛	Transwestern Oil Co.	750,000	$10	....	..	....	—.12	.48	6	2½	7⅝	4⅛
2⅛	1¼	1½	1¼	1⅜	United Gas Corp.	7,818,959	$1	....	.....	..	—.51	.25	3⅜	1½	5¼	2⅝

†Includes extras. —Deficit.

EQUIPMENT PROGRESS...

Engine Damage From Overheating Is Prevented by Trice Invention

The Trice cooling device, invented and patented by Dr. S. T. Trice, Norphlet, Ark., is said to prevent damage to engines resulting from overheating. It consists of a series of sheets, made from metal of high conductivity, so cut and apertured as to fit between any two parts of an engine without interfering with the function of these parts, and projecting outwardly so as to carry heat away from them. Wherever possible the sheets extend entirely outside the block, the projecting portion being finger-like in shape and throwing off heat as it is cooled by passing air currents.

The sheets generally are made flat where this is feasible, to facilitate the dispersion of heat, which radiates in straight lines from the point of origin.

The device does not interfere with the water-cooling system. In most cases it can be used in conjunction with the system. It continues to cool the engine even if the water-cooling system is out of order.

The following results are reported from the use of the device on an automobile engine for about 1 year: 1. Engine remains cool even after 5 or 6 hours continuous operation at 40 m.p.h. 2. Engine stands up better on long trips and fewer repairs required. 3. Less vibration; power retained longer. 4. More constant ratio of power. 5. Bearings remain in good condition almost twice as long as before. 6. All parts show less depreciation. 7. Engine hits better, and spark plugs require less attention. 8. Crankcase oil does not thin so much; less oil needed. 9. Valve noise eliminated.

The size and shape of the sheets vary to fit individual needs. The device can be made for any type of engine or for any machine subject to overheating. Manufacturers who contemplate adoption of the device should communicate with the inventor.

Novo Generating Sets Especially Designed for Oil-Field Use

A new line of specially designed oil-field generating sets has been announced by Novo Engine Co., Lansing, Mich. These sets are easily portable, with sturdy steel skids with end loops. They also can be furnished on trucks. Power units can be equipped with combination gas and gasoline carburetor. The outpit is weatherproof, with cover over the unusually safe switchboard.

Novo generators are built in 15 different sizes powered with air or water-cooled gas and gasoline engines or by diesel units. Literature on these sets may be obtained by writing the plant or contacting any National Supply Co. store.

Two New Hard-Facing Electrodes Announced by Lincoln Electric

The Lincoln Electric Co., Cleveland, Ohio, announces two new hard-facing electrodes, Faceweld No. 1 and Faceweld No. 12. Both are cast abrasion-resisting alloys used for hard facing by the metallic arc process. Both are coated, have exceptional arc characteristics and produce a smooth, dense deposit. Deposits are resistant to abrasion, but are not excessively hard and brittle. Faceweld is said to bond well with all types of ferrous alloys.

Faceweld No. 1 is a general-purpose hard-facing electrode and is the softer and tougher. It is used for surfacing digger teeth, scarifiers, grader blades, cement plant machinery, etc., by arc welding.

Faceweld No. 12, applied by arc welding, is somewhat harder than Faceweld No. 1 and has superior resistance to abrasion. Its resistance to impact is excellent for this type of material, but not quite as high as Faceweld No. 1.

Applications include screw conveyors, conveyor sleeves, gyratory crushers, power shovel and dragline bucket parts, dredge pump impellers and casings, cement mill machinery, etc.

"Easy Fished" Sucker-Rod Guide Is Built to Reduce Breakage

The "Easy Fished" two-piece sucker-rod guide and paraffin scraper, put on the market by A. D. Larson Supply Co., 1339 S. E. Twenty-ninth Street, Oklahoma City, Okla., is so designed that the guide part carries none of the load; and as the shaft, which carries the load, is made of high-grade sucker-rod steel, breakage is held to a minimum.

All breaks in this unit can be easily fished with the conventional types of sucker-rod sockets, according to the manufacturer. Long-wearing quality steel is used for the wearing surface and high-strength steel is used to carry the load. The device has ample fluid-passage slots and wearing surface.

"Chrome Face" Steel Tapes Easy To Read in Gaging Oil Tanks

"Chrome Face" is the name of the line of steel measuring tapes put on the market by the Lufkin Rule Co., Saginaw, Mich. Their markings are durable as well as easy to read, characteristics that are important to every user of tapes. They are accurate steel tapes, chrome-plated, with jet black markings and satin chrome-white surface, unusually free of glare. Hence, the permanent markings stand out in sharp contrast, showing up well even in poor or artificial light. Furthermore, being built up by chrome plating, these tapes are extra strong and resist rust. The surface is smooth, hard, and easy to clean, and the tape, being of metal throughout, will not crack, chip or peel. New cases and frames of improved design and appearance have been built for this new line.

As a tank-gaging tape the Chrome Face line will appeal to the oil industry for two principal reasons: On its dull chrome-white surface the oil line is easy to find and the measurement is easy to read, even in poor light. A full line of Chrome Face gaging tapes is offered, including the "Atlas," also the others with plumb bobs of various patterns.

Gas Laboratories Opens Office

Gas Laboratories, Inc., announces opening of general offices in the Commerce Building, Houston, Tex. E. O. Buck and A. S. Parks, consulting engineers and geologists, are the organizers and principal stockholders. Dr. Judson S. Swearingen, research chemist at the University of Texas, is associated with the new firm in an advisory capacity. All the specific problems of recycling, such as physical tests of gas, plant design, development and production programs are included in the services offered. The company is equipped with portable testing apparatus which can determine the physical analyses of wet gas and the retrograde behavior of the liquid product in the field and give actual preliminary surveys of the expected liquid yield from wells to enable the operator better to plan his spacing and development programs.

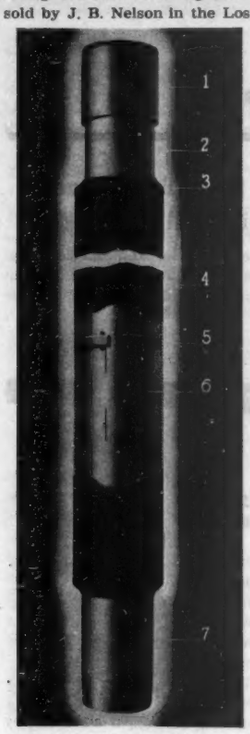
ENDS NECESSITY OF REPLACING ENTIRE ROD ASSEMBLY

To eliminate the necessity of replacing the entire rod assembly in a piston pump after the rod wears down, a new replacement type has been developed by Regan Forge & Engineering Co., P. O. Box 150, San Pedro, Calif. It is a sleeve type, providing the use of a sleeve around the rod. Instead of wear being imposed on the rod proper, it occurs upon the sleeve, which is a cheaper element and can be replaced more economically.

The entire assembly consists of a rod, wear sleeve, universal sealing ring, universal nut and jam nut. With this construction the manufacturers say, it is possible to heat-treat the rod member uniformly to obtain maximum physical properties for increasing strength and to resist fatigue. The sleeve member also is heat-treated. Distortion and warpage are reduced. These replaceable rods are furnished in all sizes to fit all makes of piston pumps, and are furnished with A.P.I. taper or universal ends.

Prepacked Gravel Liners Control Sand Entering the Oil String

Prepacked gravel liners for the control of sand entering into the oil string are being manufactured and sold by J. B. Nelson in the Los Angeles Basin fields of California. They are used in new wells where the liner is set in the open hole and in wells where the casing has been gun-perforated.



The illustration shows the principle of this liner: (1) Casing coupling; (2) elevator or clamp space; (3) steel end rings upon each section of the liner, enabling them to slide freely on the specified sized casing and there be welded; (4) outer covering of hand-woven spring-steel wire, constructed to give maximum resistance to deformation or collapse (mesh and wire line are variable so a wide range of gravel sizes can be used to meet various conditions, the standard mesh covering normal operations); (5) every 8 ft. a spacer for gravel thickness pack control; (6) perforations specified or made depending upon the conditions; (7) tong space.

The company supplies these liners for use on new or used casing. With new casing, units are built to specification and delivered with spacing of units, size of gravel, and size and spacing of perforations necessary to meet the prevailing conditions. The same features of service apply where old casing is utilized.

It is said by the manufacturer that field operations have shown the capacity of the liner to cover any sand section of any well, have aided production, lessened wear on the pump, and increased the efficiency of all-around recovery. Fuller information may be obtained from the manufacturer, J. B. Nelson, 3035 Cherry Avenue, Long Beach, Calif.

Quarter Turn Opens or Closes New Leakproof Gage Cock

To provide a leakproof gage cock which can be completely opened or closed with a quarter turn, engineers of Merco Nordstrom Valve Co., 400 Lexington Avenue, Pittsburgh, Pa., have developed a lubricated type for test pressures up to 4,000 lb. The gage cock has a rated working pressure for water, oil, and gas of 2,000 lb. Its body is forged steel and it has a stainless-steel plug. Stick lubricant is inserted under a lubricant screw which can be turned down. Turning of the screw transmits hydraulic pressure to the seat, and in the event the cock becomes hard to turn, the pressure exerted will loosen it.

Special lubricants are available for steam. The new gage cock is made in ¼ and ⅜-in. sizes and is wrench-operated.

Marmon-Herrington Is Introducing New All-Wheel-Drive Ford V-8

Demand from truck lines and contractors for a short-coupled, medium-weight all-wheel-drive truck to be used for semitrailer work in highway trucking and for general construction and excavation services, has led Marmon-Herrington Co., Inc., Indianapolis, Ind., to offer a standard Ford 101-in.-wheelbase cab-over-engine model, converted to all-wheel-drive in the Marmon-Herrington factory.

Extraordinary maneuverability is a feature of this vehicle. The short wheelbase provides an unusually short turning radius. All-wheel-drive traction and power give ability to climb steep hills and insure performance in soft or slippery footing. Normal front-wheel placement gives a greater approach angle for getting in and out of ditches, excavations, etc., without "rooting." Cab-over-engine design permits better load balancing, more uniform traction, and less tire wear.

The Marmon-Herrington line now comprises conversions of all standard Ford trucks, passenger cars, and commercial cars to all-wheel-drive, and a complete series of heavy-duty all-wheel-drive trucks and truck-tractors with gross capacities up to 70,000 lb.

Replacement of Flange Gaskets Simplified by Garlock Jack

The Flange-Jack, introduced by the Garlock Packing Co., Palmyra, N. Y., is a new tool, designed to do a specific job better, faster, and more safely and economically. The job is the opening of flanges on existing pipe lines for the renewal of gaskets. This always has been a hard job, often dangerous, and sometimes the cause of expensive shutdowns.

With Flange-Jacks joints are opened quickly even when the working space is limited. Flange faces will not be damaged, there will be no sparks caused by hammer blows on chisels or wedges, and no resulting vibration in the pipe line. As the jack-screws are tightened the flanges are separated gradually and evenly.

After the new gasket has been applied the joint is closed as easily as it was opened. Bolt holes are in alignment and the gasket is positioned properly. There are no wedges to fly, and no jerking of the pipe to cause leaks at other joints. The jaws are heavy one-piece steel forgings capable of withstanding tremendous pressure. In repeated laboratory tests Flange-Jacks have opened joints against a load of 15 tons, without damage to the jacks or to the flanges. The points of the steel screws are case-hardened. Flange-Jacks are always in pairs and are available in three sizes.

TRADE LITERATURE

CHICAGO PNEUMATIC TOOL CO., 6 East Forty-fourth Street, New York.—12-page booklet covering complete line of concrete vibrators.

ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.—Revised catalog section, No. 151, introducing new horsepower ratings for multiple V-belt drives based on the new formula adopted by the industry.

WALWORTH CO., 60 East Forty-second Street, New York.—February-March issue Walworth Today, featuring pictures of oil-industry applications of Walworth valves.

W. S. DICKEY CLAY MANUFACTURING CO., Kansas City, Mo.—Booklet describing and illustrating Dickey side-socket glazed conduit pipe.

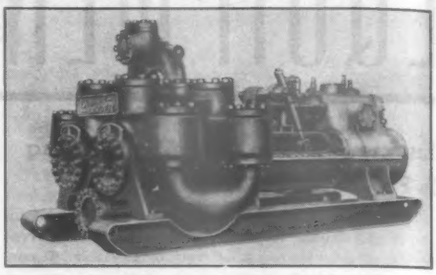
THE BABCOCK & WILCOX CO., 85 Liberty Street, New York.—Bulletin G-128, Design 32 cross-drum boiler for pressures of 250 lb. or less.

THE GATES RUBBER CO., Denver, Colo.—Current issue Industrial News, featuring article telling how three pump speeds were obtained with constant-speed motor by using Gates Vulco rope drives.

BAIRD MANUFACTURING CO., Tulsa.—Bulletins on V-Pac stuffing boxes to fit O.W.I. No-los flow tee base; ball and seat testing machine, water-bubble type; and Diamond Alloy seats and balls.

Gardner-Denver Pumps Specially Adapted for Slush Service

A new line of 20-in. steam slush pumps announced by Gardner-Denver Co., Quincy, Ill., embodies ruggedness in design and special features which, rigid field



tests indicate, make them unusually adapted for slush service.

A new alloy iron, Gardurloy, is said to have tensile strength comparable to the better grades of cast steel. It shows a dense close-grained structure of uniform hardness throughout very thick metal sections and also throughout castings of irregular cross sections. Tests are said to have proved that it has greater resistance to the erosive action of slush than either gray iron or cast steel.

The smooth performance of these pumps is said to be the result of increasing the size and streamlining the fluid passages for smoother flow. Longer life and less upkeep result from a specially constructed divided fluid end consisting of two separate cylinder castings which are united by the combined suction manifold and cylinder foot at the bottom and by the discharge manifold above the cylinder. All walls of the fluid end are exposed for inspection and there are no inner baffles or metal sections between the two sides of the fluid end to be cut through by mud. Fluid cylinders are regularly fitted with specially designed Gardner-Denver "Slushproof" liners, rods, pistons, and valves.

No. 82 Speed Star Driller Offers Variety of Important Features

The No. 82 Speed Star, announced by the Star Drilling Machine Co., Akron, Ohio, is of compact, all-steel construction, with electric-welded main frame only 13 ft. long and main sills 12 in. deep. It mounts on truck with standard chassis. All controls are at the operator's finger tips. The chain-driven, free-running reels are controlled by friction clutches and ride on bronze bushings for easy running and long life. The six-cylinder engine gives speed, power and flexibility.

The upper section of the mast latches automatically. Guy lines are carried already connected to the top and lower sections. With the stakes and stake eyes regularly furnished, anchoring the mast is a matter of minutes.

The husky mast, which telescopes, is built for a safe working load of 15,000 lb. and can be used at either 40 or 50-ft. height. In tearing down, the latch is disengaged from the ground. Crown and sand-line sheaves

are mounted on Timken roller bearings with large pockets for grease (one greasing ordinarily does for a whole job). The casing sheave turns on a big bronze bushing.

More than ample braking surfaces and extra thick lining mean efficiency and long wear. Bull reel and sand reel brakes are air cooled. The mere weight of

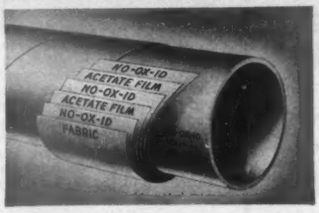
the brake lever is usually enough to keep the bull reel from slipping when spudding.

The double-crank spudder is advanced in design. Its built-in, patented shock-absorber, with recoil control, is adjustable to various weights of tools; is equally efficient for new drilling and cleaning out. It gives a correct drilling motion that makes hole fast and protects the machine from shock.

The No. 82 Speed Star is recommended for new drilling to 1,500-ft. depths and for tailing in after rotary, for drilling deeper, swabbing and clean-out work generally to 2,500 ft. The machine swings 2,500 lb. of tools at 1,000-ft. depths and lighter tools at correspondingly greater depths.

No-Ox-Idized Wrapper Protects From Destructive Moisture

For protecting pipe and pipe coatings where moisture conditions are unusually severe, a new wrapper, the No-ox-idized dielectric, has been developed in the



research laboratories of Dearborn Chemical Co., 310 South Michigan Avenue, Chicago.

This wrapper employs an open-mesh fabric and two sheets of heavy acetate membrane, each coated on both sides with No-ox-id. All are laminated together into a single wrapper. The two layers of acetate membrane give the wrapper a high dielectric strength and an unusually high resistance to the penetration of moisture. The acetate laminations are insoluble in oil. These properties are said to make the No-ox-idized dielectric wrapper especially valuable for protecting underground pipe in localities where the ground is intermittently wet and dry or oil-soaked.

The flexibility of this new wrapper makes it suitable for hand application to welded joints. The consistency of the No-ox-id used, together with the flexibility of the open-mesh fabric, provides a seam that is self-sealing.

Making a Million With "Gusher"

It's as hard to make a million with the game of "Gusher" as it is with a wildcat, according to equipment men and oil producers who have succumbed to the new form of entertainment. The fascination held by the oil-producing industry for folk who dream of making a million quickly suggested the game, which is manufactured and sold by Carrom Industries, Inc., Ludington, Mich. "Gusher," originating in Centralia, Ill., oil town, was invented by Charles Deaton, son of a widely known geologist. Two to six can play the game, in which the participants drill for oil and buy, trade or sell leases. The first to make a million is the winner. No dice, spinners, or cards are used. No two games ever are alike. A given property may produce a gusher in one game and a dry hole in the next.

Smallest Porcelain Raschig Rings

For the first time in the history of the ceramic industry the United States Stoneware Co., 60 East Forty-second Street, New York, is producing ¼-in. o.d. porcelain raschig rings. Their wall thickness is 1/16 in., about 85,000 rings being required per cubic foot. The free space is about 55 per cent, and there is about 212 sq. ft. of absorption surface per cubic foot. This is the smallest size ever attempted. The commercial production of these ¼-in. rings was made possible through an entirely new extrusion method. The rings are of particular interest to users of experimental columns.

New Plant for Elastic Stop Nut

Elastic Stop Nut Corp., Elizabeth, N. J., has broken ground for a plant on Vauxhall Road, Union, N. J., a suburb of Newark. The plant will be used solely for the manufacture of the company's extensive line of self-locking nuts. It is laid out for efficient handling of materials and fabrication of the product, with provision for expansion.

AMONG EQUIPMENT MEN...

Alco Products Division Manager

Hugh M. Corrough, recently appointed manager of the Alco Products Division of American Locomotive Co., was born in Bondurant, Iowa. After attending the East Des Moines High School and Iowa State College he went to work in 1923 for Empire Oil & Refining Co. in Ponca City, Okla. He continued with this company at various refinery operating assignments in Ponca City and Okmulgee, Okla., including cracking plant foreman and refinery construction engineer, until 1928, when he was transferred to the company's Tulsa general office in charge of refinery construction design and maintenance. In 1934 he moved to the Cities Service Oil Co.'s executive offices in New York.

Mr. Corrough has been with Alco Products Division of American Locomotive Co. since June 1936, serving as chief mechanical engineer, assistant manager of engineering, and manager-engineering. The last-named position he held up to February 1, 1940, when he was appointed manager.

Represents Koppers in Southwest

W. A. Leech, Jr., recently appointed Southwest representative for Koppers Co., engineering and construction division, at its new offices in Tulsa, has spent his 20 years of professional life in the oil and gas industry. He was born in Philadelphia, Pa., in 1898. After a year at Stevens Institute he entered Lehigh University where his course was interrupted by World War service.

The cadet-engineers course of the United Gas Improvement Co. in Philadelphia occupied him for 2 years. After that he was with Seaboard By-Product Coke Co., M. W. Kellogg Co., U.G.I. Contracting Co., Alcorn Combustion Co., Koppers Construction Co., Koppers Research Corp., and Philadelphia Coke Co. During this period he supplemented his college work with further study at Columbia and Temple universities.

For the past 4 years he has been with Koppers Co. engineering and construction division, interested largely in research, construction, and operation of plants for the removal of hydrogen sulfide from manufactured, refinery, and natural gases.

BUSINESS NOTES

David T. Marvel, formerly manager of tube sales for Timken Steel and Tube Division of Timken Roller Bearing Co., Canton, Ohio, has joined National Tube Co.'s sales organization as assistant manager of sales, Ellwood sales division, Ellwood City, Pa.

Midco Bailer Co., Oklahoma City, Okla., manufacturer of suction-type clean-out bailers, has announced that the following supply stores will carry a complete stock of bailers and parts: Houston Oil Field Materials Co., Hebronville, Tex.; Cen-Tex Supply Co., Breckenridge, Tex.; Industrial Supply Co., Freer, Tex.; Hiler Supply Co., Hobbs, N. M.

Hewitt Rubber Corp., Buffalo, N. Y., has appointed Benjamin T. Moffatt manager of its New York district sales office.

C. N. Kirkpatrick has been elected vice president and general manager of Landis Machine Co., Inc., Waynesboro, Pa., manufacturer of thread-cutting die heads and machines. He was formerly vice president in charge of sales and also secretary. J. H. Elliott, purchasing agent, succeeds Mr. Kirkpatrick as secretary, but continues also as purchasing agent.

Wynn Mace has been transferred from the factory of Jensen Brothers Manufacturing Co., Coffeyville, Kans., to Salem, Ill., where he will sell and service Jensen pumping units under the direction of Tom Bagby, already stationed there.

Feldbush Is Made Vice President

H. A. Feldbush, elected a vice president of Worthington Pump & Machinery Corp., will have his headquarters in Holyoke, Mass., directing the Holyoke works in the manufacture of air and refrigerating equipment. Mr. Feldbush was formerly general manager of Worthington's Carbondale division at the Harrison, N. J., works, and in his new capacity will continue as an active member of the Carbondale operating committee.

After graduation from Westminster College in Fulton, Mo., Mr. Feldbush received his B.S. degree in mechanical engineering from Washington University, St. Louis, in 1915, the same year joining Worthington. He was promoted to junior first engineer in 1916 and transferred to the Cincinnati, Ohio, plant, 4 years later, being made engineer of tests. He was advanced to general plant superintendent in 1923 and works manager in 1925.

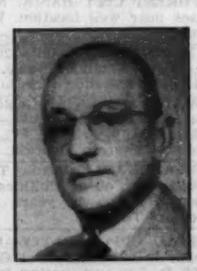
May Now General Sales Manager

Stephen C. May has succeeded M. L. Hough as general sales manager of Darling Valve & Manufacturing Co., Williamsport, Pa. Mr. May was formerly manager of industrial accounts for Iron Fireman Co., and more recently eastern manager for G. S. Blakeslee & Co.

Mr. Hough, president and treasurer of Darling Valve & Manufacturing Co., announced that Mr. May's appointment as general sales manager in no wise affects the general policy of the company, long known as manufacturer of gate valves and fire hydrants, and of Darcova composition valve cup.

H. O. Powell Joins Mid-Continent

After many years of continuous service in various executive capacities with National Supply Co., Harry O. Powell has become associated with Mid-Continent Supply Co., whose general offices are in the Mid-Continent Building, Fort Worth, Tex.



Mr. Powell is regarded as an authority on oil-country pipe and casing requirements. As manager of the tubular division for Mid-Continent Supply he will have headquarters at the company's main offices in Fort Worth. He will cover all territories served by Mid-Continent Supply Co., which has large facilities for supplying complete equipment requirements for the petroleum industry.

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